Die Rol van Diplomasie en Buitelandse Beleid in die bevordering van Kernkrag in Suid-Afrika se 'Regering van Nasionale Eenheid'

Hügo KRÜGER

My Background – Civil Nuclear Engineering

- BIng Siviele Ingenieurswese (Universiteit van Pretoria)
- MSCin Siviele Kerningenieurswese van École Spéciale des Travaux Publics, du bâtiment et de l'industrie (ESTP Parys)

Werkservaring

- Sement/Vliegasbedryf in SA (Lafarge SA)
- Hinkley Point C (Tractebel Engineering)
- ITER, TAPB Gebou(Tractebel Engineering)
- Olie- en Gasbedryf in die konstruksie van aflandige wind- en LNG-infrastruktuur (SAIPEM)
- Tans werkend as 'n tegniese koördineerder op die EPR2
- Die menings wat ek vandag uitspreek is my eie. Ek het voorheen voorleggings gemaak aan die SA Parlement se Portefeuljekomitee oor Energie, oor Eskom en het voorleggings ingedien vir die IRP.
- Newe-aktiwiteite: Podcast, Substack, skrywer, en gereelde rubriekskrywer vir IOL getiteld « Engineering Dissent »
- Betrokke by Truth in Energy (TiE) in Suid-Afrika en lewer gereeld kommentaar in die media.
- Inligting oor Kernkrag: Getroud met 'n Iraanse vrou (Kernkrag, internasionale betrekkinge en propaganda is 'n relevante onderwerp)"

SI-eenhede en Basiese Konsepte

- Energie = Joule = [Newton x Meter]
- Krag = Watt = 1 Joule/Sekonde = [Newton x Meter/sekonde]
- Elektrisiteitsopwekking = watt x sekonde = [joule] = [Newton x Meter]
- Termiese Opwekking = watt x sekonde = [joule] = [Newton x Meter]

$1MW_{th} = 0.3\text{-}0.5MW_{e}$

Doeltreffendheid = $1 - T_{koud}/T_{warm}$

Die Kwalifikasies van ons Leiers

Chinese government and previous occupations/majors

Hu Jintao (President)	Wen Jiabao (Premier)	Wu Bangguo (Chairman)	Jia Qinglin (Chairman)
			
Hydraulic engineer	Geomechanics	Electron tube engineering	Electrical engineering

US government and previous occupations/majors

Obama (President)	Biden (Vice president)	Boehner (Speaker)	Roberts (Chief justice)
			
Lawyer	Lawyer	Business administration	Lawyer

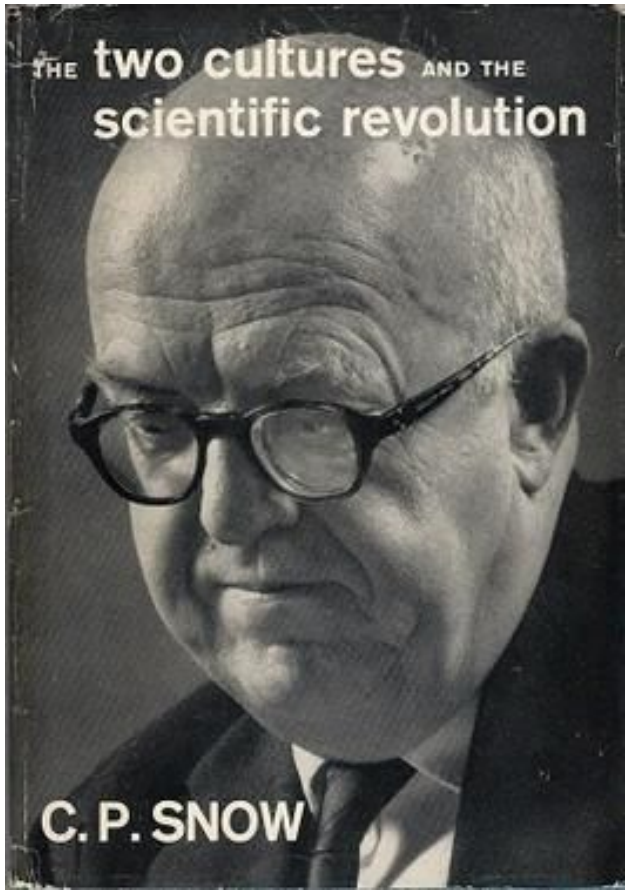
- Asiatiese leiers het geneig om tegniese kwalifikasies te hê. Westerse en
- Afrikaanse leiers neig om prokureurs en sakemanne te wees.

Ja, dit is 'n veralgemening

Die Twee Kulture - CP Snow, 1959

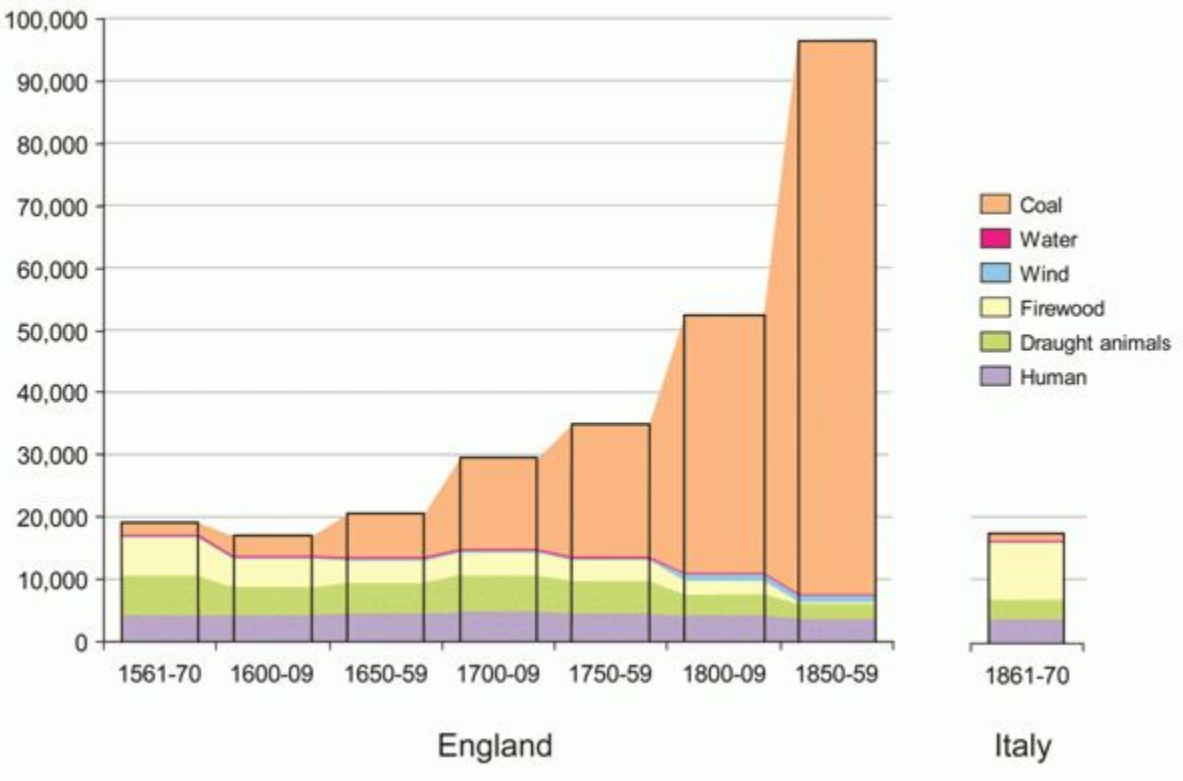
“Baie keer was ek teenwoordig by byeenkomste van mense wat, volgens die standaarde van die tradisionele kultuur, as hoogs opgevoed beskou word, en wat met aansienlike entoesiasme hul ongeloof oor die ongeletterdheid van wetenskaplikes uitgespreek het. Een of twee keer was ek uitgelok en het die geselskap gevra hoeveel van hulle die Tweede Wet van Termodinamika kon beskryf. Die reaksie was koud: dit was ook negatief. Tog het ek iets gevra wat die wetenskaplike ekwivalent is van: Het jy 'n werk van Shakespeare gelees?

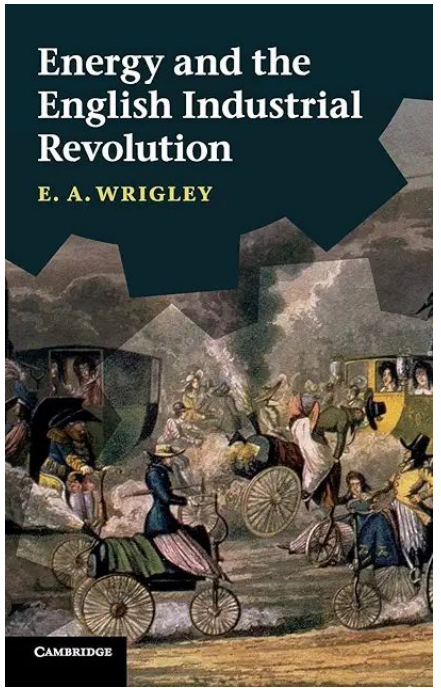
Nou glo ek dat as ek 'n selfs eenvoudiger vraag gevra het – soos, Wat bedoel jy met massa, of versnelling, wat die wetenskaplike ekwivalent is van om te vra, Kan jy lees? – nie meer as een uit tien van die hoogs opgevoedes sou gevoel het dat ek dieselfde taal praat nie. So word die groot gebou van moderne fisika opgerig, en die meerderheid van die slimste mense in die Westerse wêreld het omtrent soveel insig daarin as wat hul neolitiese voorouers sou gehad het.”



Energie en Ekonomie
Lae Entropie Teorie van Rykdom'

Adam Smith, David Ricardo en Thomas Malthus het in terme van drie basiese produksiefaktore gedink, naamlik grond, arbeid en kapitaal. Laasgenoemde twee kon in beginsel onbeperk uitgebrei word, maar die eerste kon nie



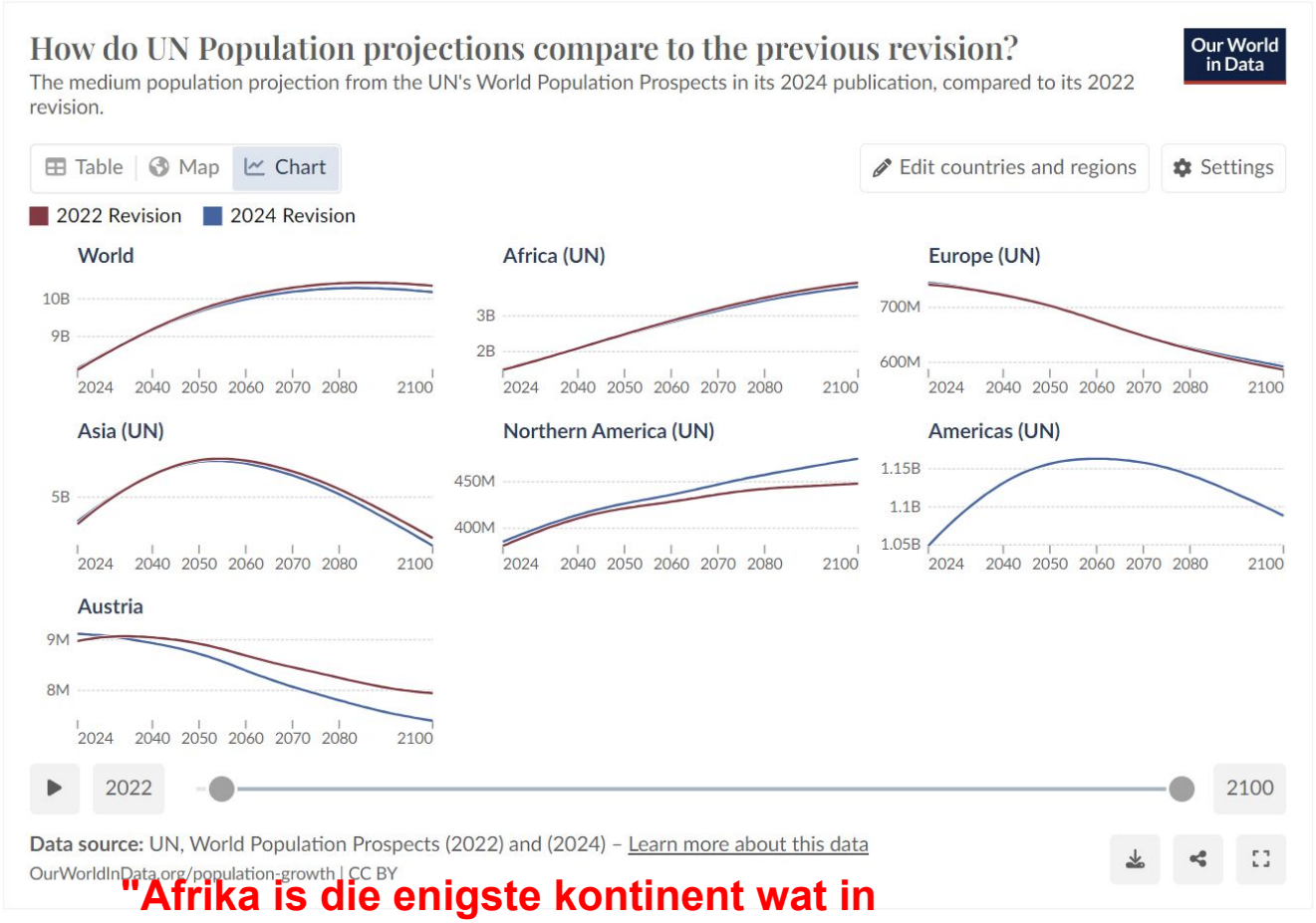


Opening Pandora's box: A new look at the industrial revolution

Tony Wrigley / 22 Jul 2011

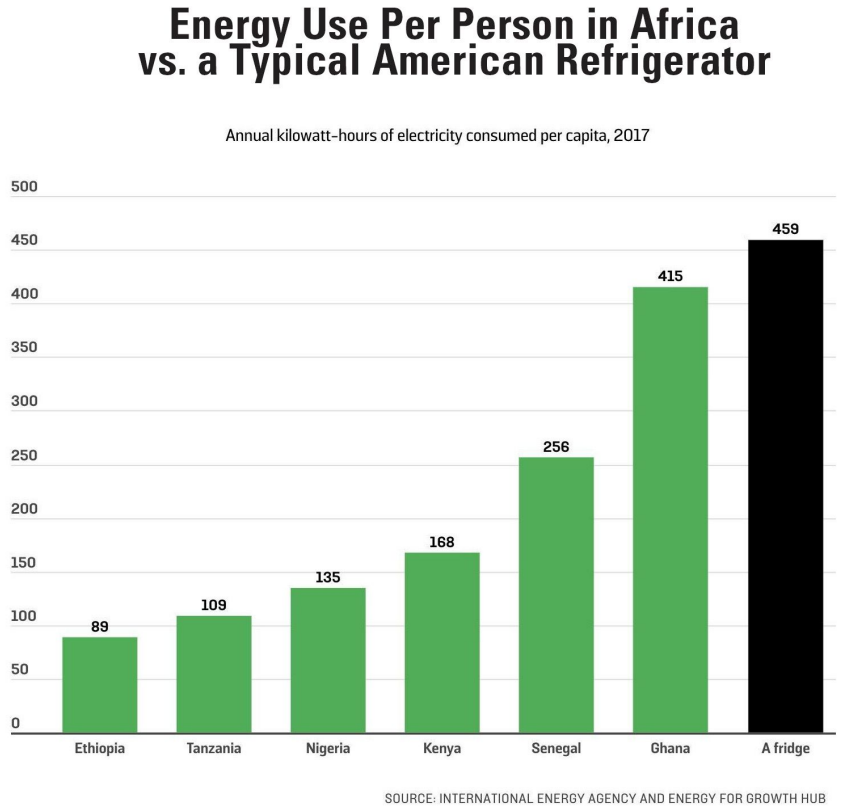
Before the industrial revolution, economists considered output to be fundamentally constrained by the limited supply of land. This column explores how the industrial revolution managed to break free from these shackles. It describes the important innovations that made the industrial revolution an energy revolution.

https://cepr.org/voxeu/columns/opening-pandoras-box-new-lo
ok-industrial-revolution



"Afrika is die enigste kontinent wat in hierdie eeu se bevolking sal verdubbel weens verstedeliking. Teen 2100 sal:

- **4 uit 10 mense Afrikaans wees**
- **4 uit 10 mense Asies wees**
- **1 uit 10 mense Amerikaans wees**
- **Minder as 1 uit 10 mense Europees wees."**



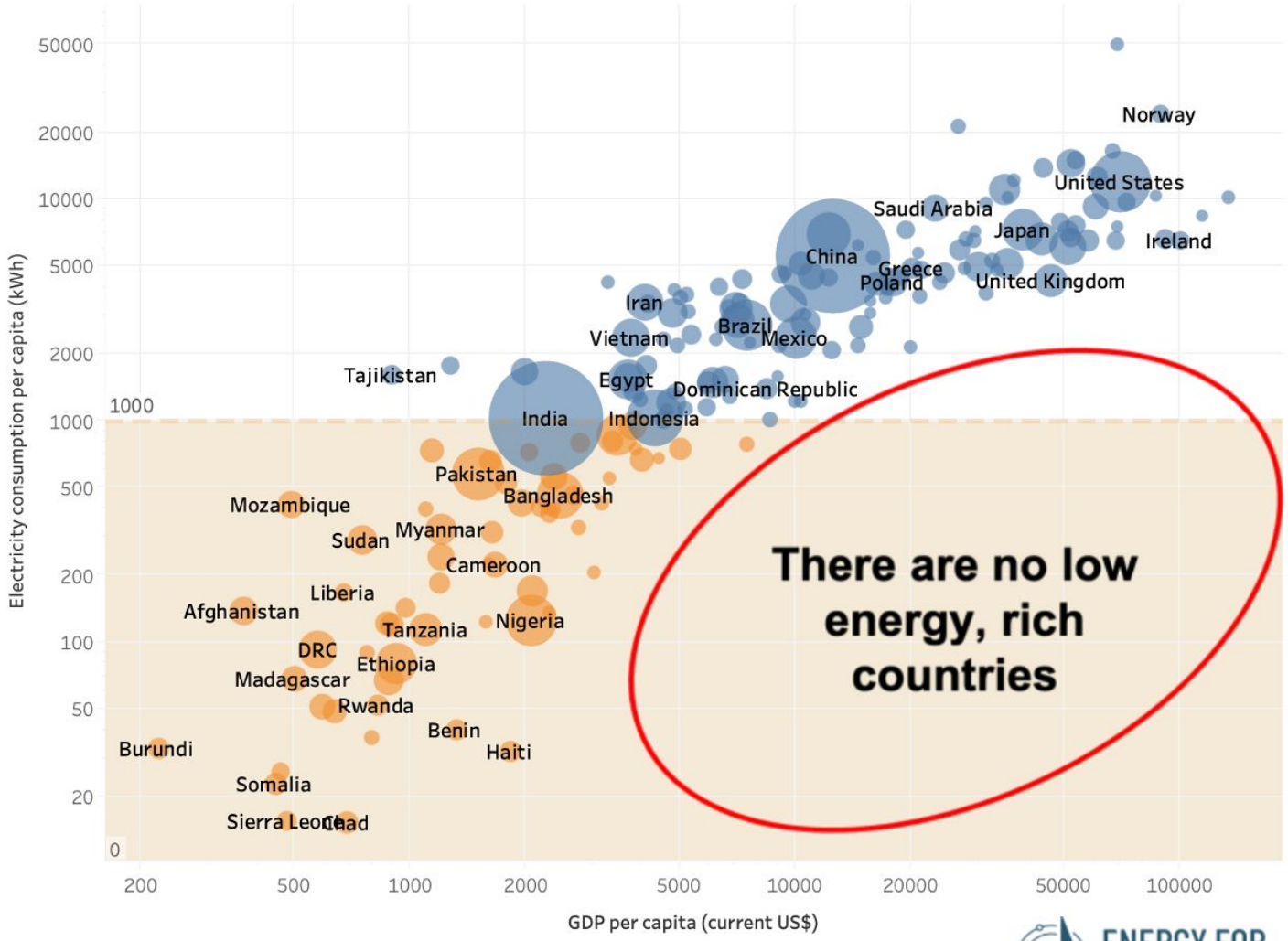
Baie Afrika-lande, gebruik minder energie per persoon as 'n Yskas!

Energie en Ekonomie: Die verhouding tot BBP

Hoe beïnvloed energie ekonomiese groei? 'n Oorsig van die bewyse

https://energyforgrowth.org/article/how-does-energy-impact-economic-growth-an-overview-of-the-evidence/

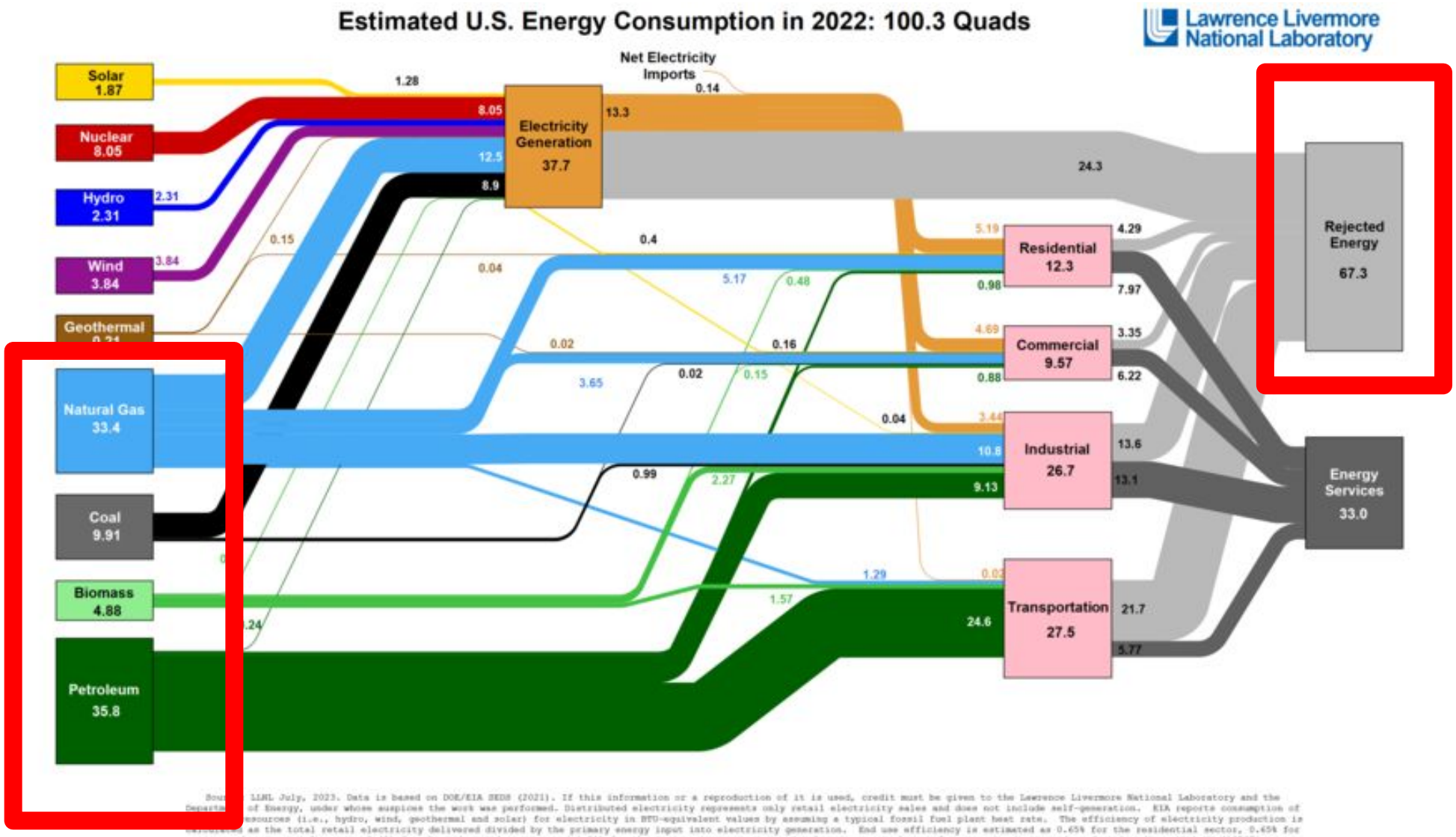
"Nie totdat die uitvinding van Watt se tweede en sogenaamde dubbelwerkende stoommasjien plaasgevind het nie, is 'n primêre aandrywer gevind wat sy eie krag genereer deur die verbranding van steenkool en water, wie se krag heeltemal onder die mens se beheer was, wat mobiel was en 'n middel van locomotie verteenwoordig het, wat stedelik was en nie, soos die waterwiel, landelik nie, en wat produksie in dorpe kon konsentreer eerder as, soos die waterwiele, versprei oor die land."
- Karl Marx, Das Kapital



Source: US Energy Information Administration, World Bank (2021)
$R^2 = 0.8$

ENERGY FOR GROWTH HUB

What is the energy transition?



Source: LLNL July, 2023. Data is based on DOE/EIA SEDS (2021). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant heat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 0.65% for the residential sector, 0.65% for the commercial sector, 0.69% for the industrial sector, and 0.21% for the transportation sector. Totals may not equal sum of components due to independent Rounding. LLNL-MI-410527

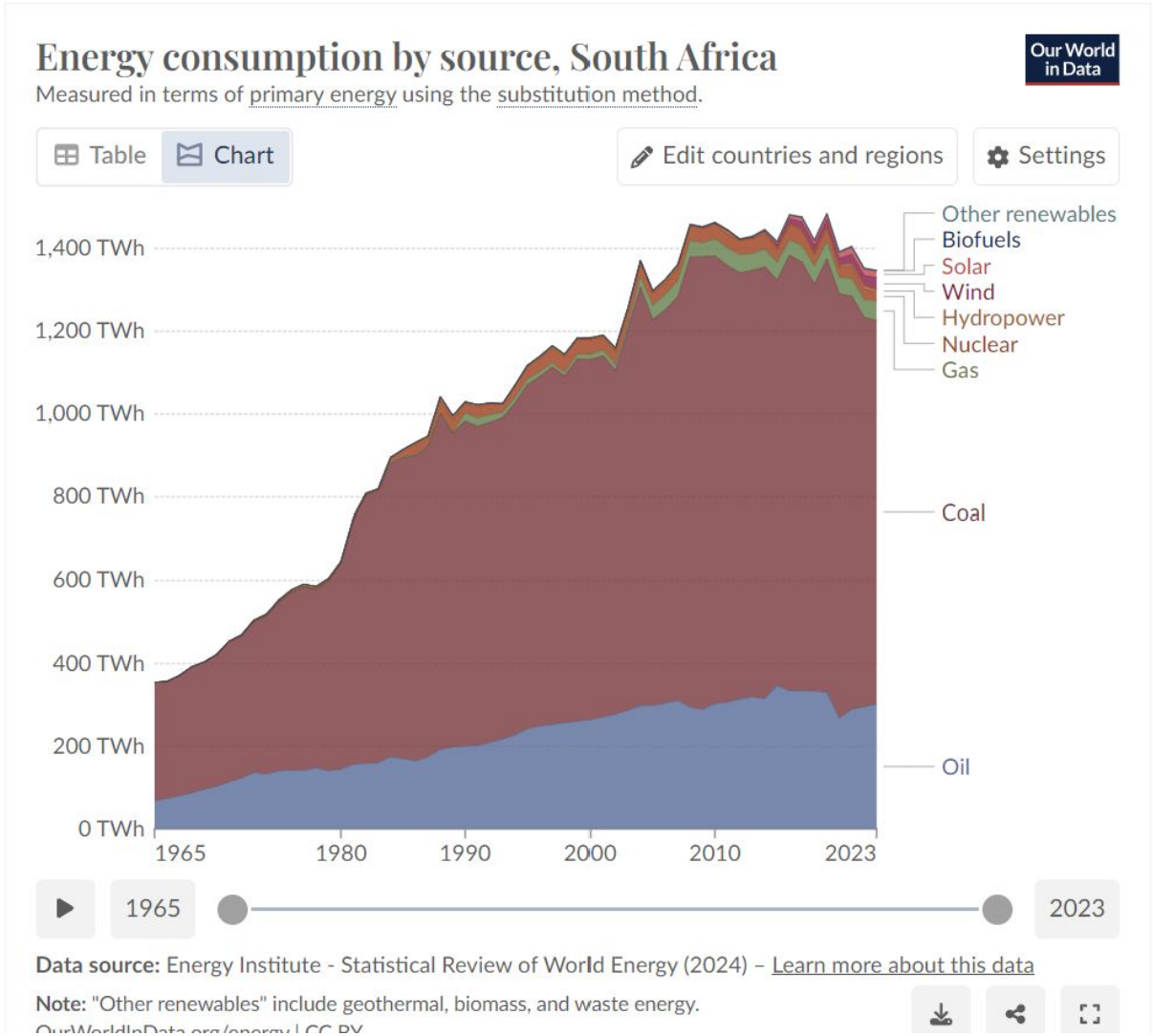
Die uitskakeling van verbranding is die aansporing tot massa-elektrifikasie en verbeterde doeltreffendheid.

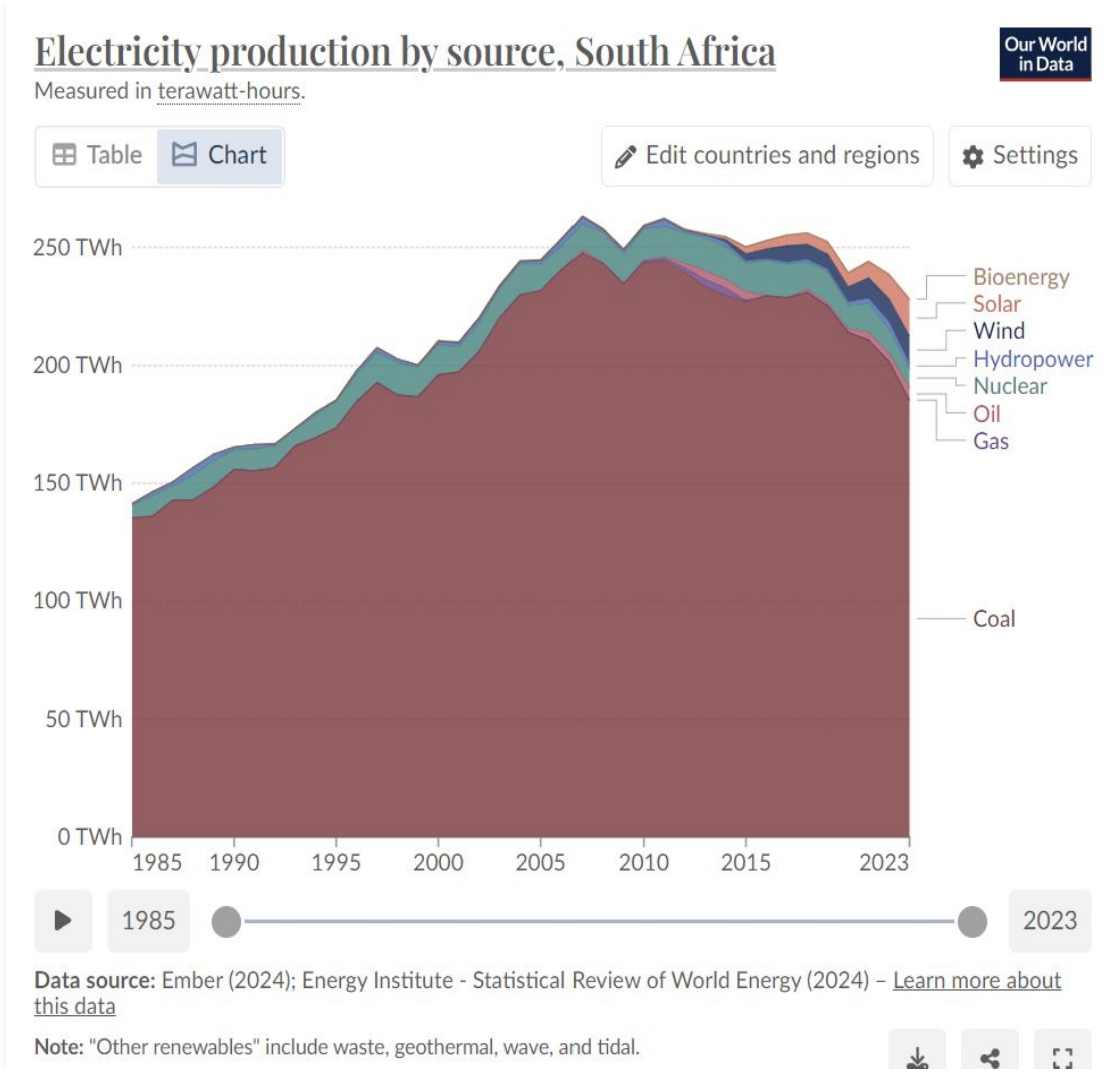
7 Hoofbronne van energie:

- **Sonenergie**
- **Windenergie**
- **Kernenergie**
- **Hidro-energie**
- **Steenkool**
- **Metaangas (LNG)**
- **Olie**

Wat van Suid-Afrika?

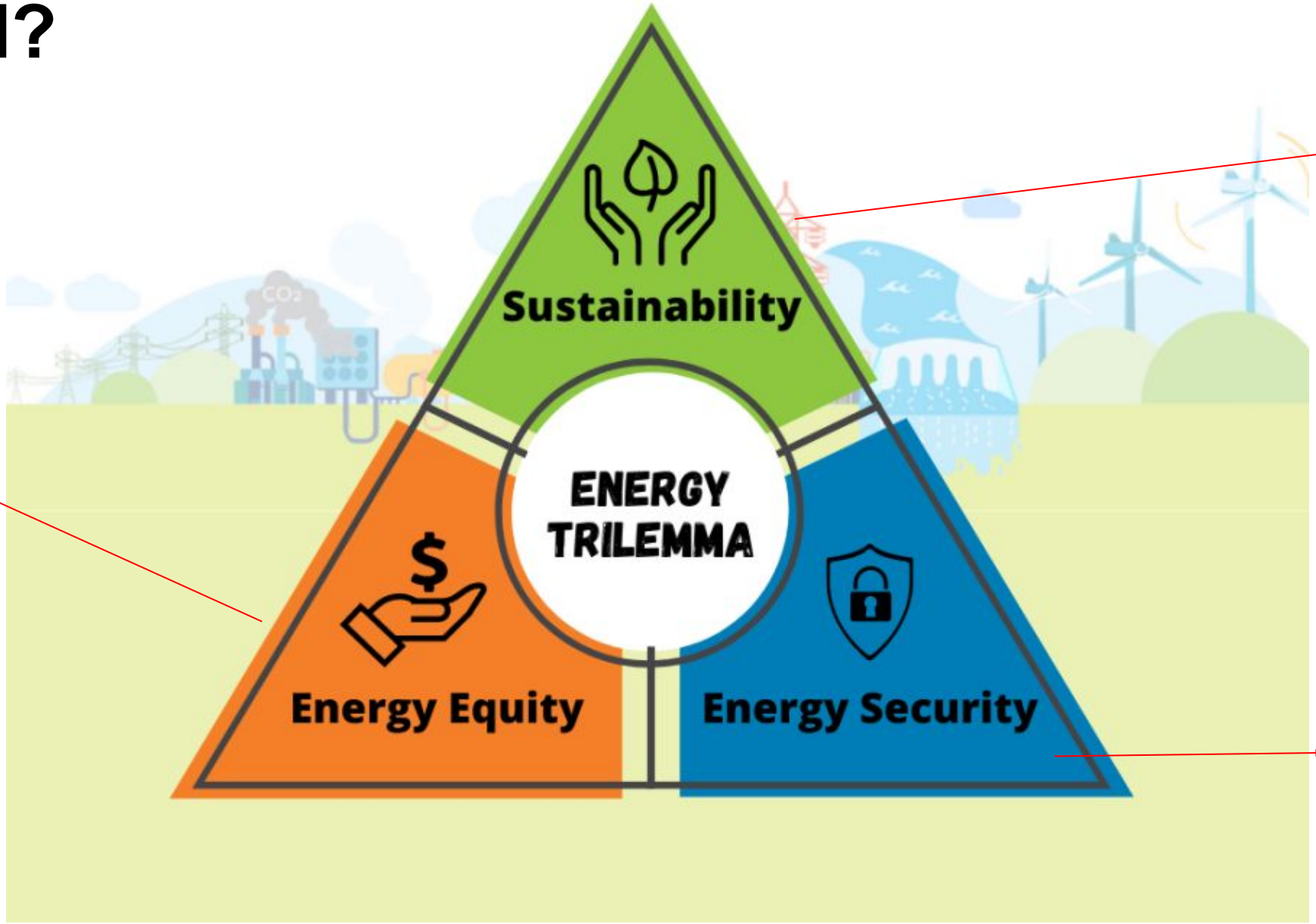
Wind- en sonenergie neem toe, sowat 10%.
Kernenergie is 5%.





Steenkool bly die ruggraat van Suid-Afrika se industriële ekonomie, in terme van TOTALE ENERGIE en ELEKTRISITEIT

Wat moet ons prioriteite wees in terme van Beleid?



3de Prioriteit: Dekarbonsiering en Luggehalte.

2de Prioriteit: Die koste/waarde vir die verbruiker.

1ste Prioriteit: Eindig beurtkrag, selfs al beteken dit om steenkool te verbrand!

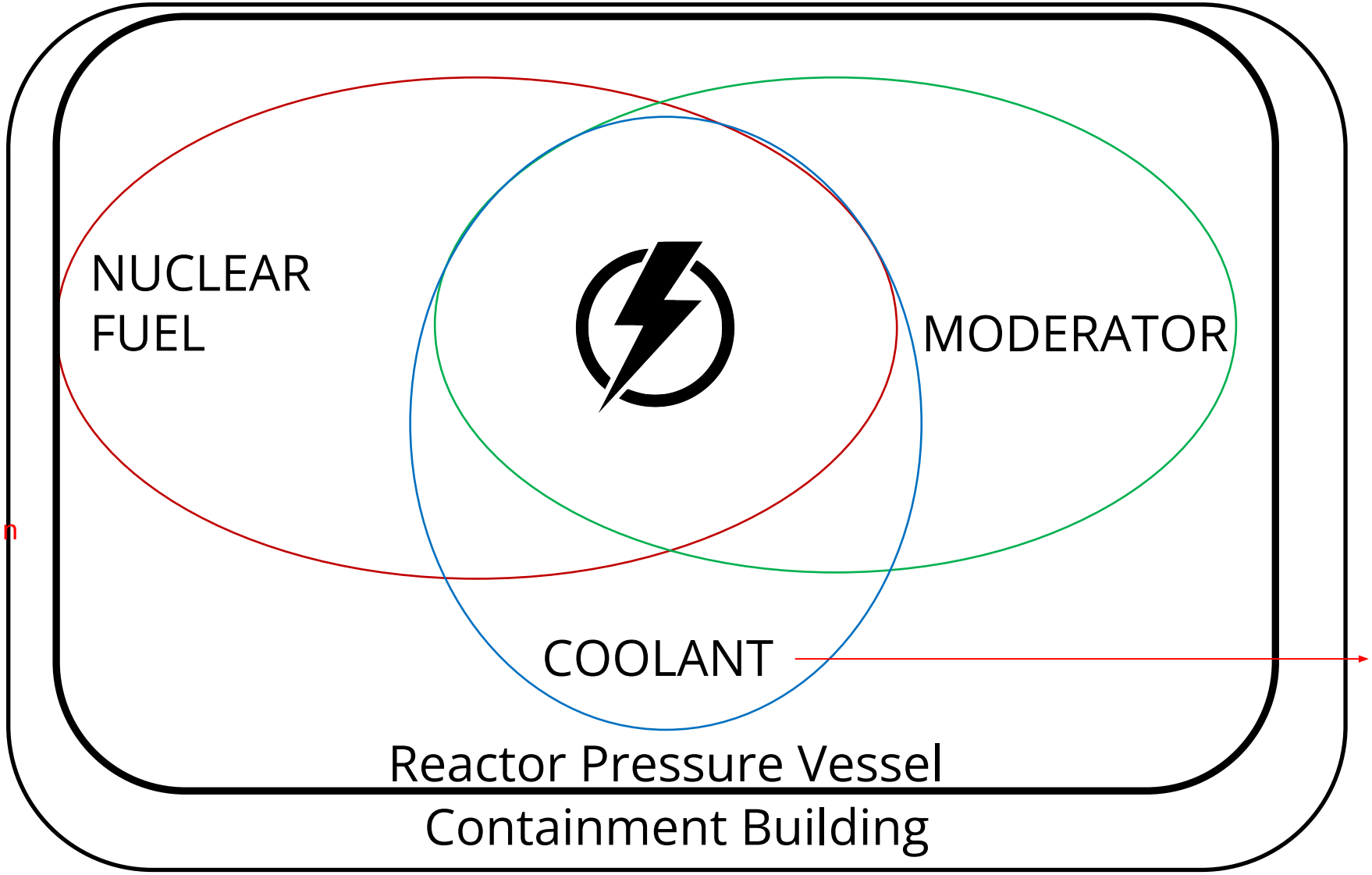
Nuclear Power Basics

Natuurlike Uranium
Laag-verrykte Uranium
MOX-brandstof
Thorium-brandstof, ens.

Tsjernobil het 'n verkoelingsverlies gehad, maar nie 'n verlies van moderator nie.

Fukushima het 'n verlies van moderator en verkoeling gehad.

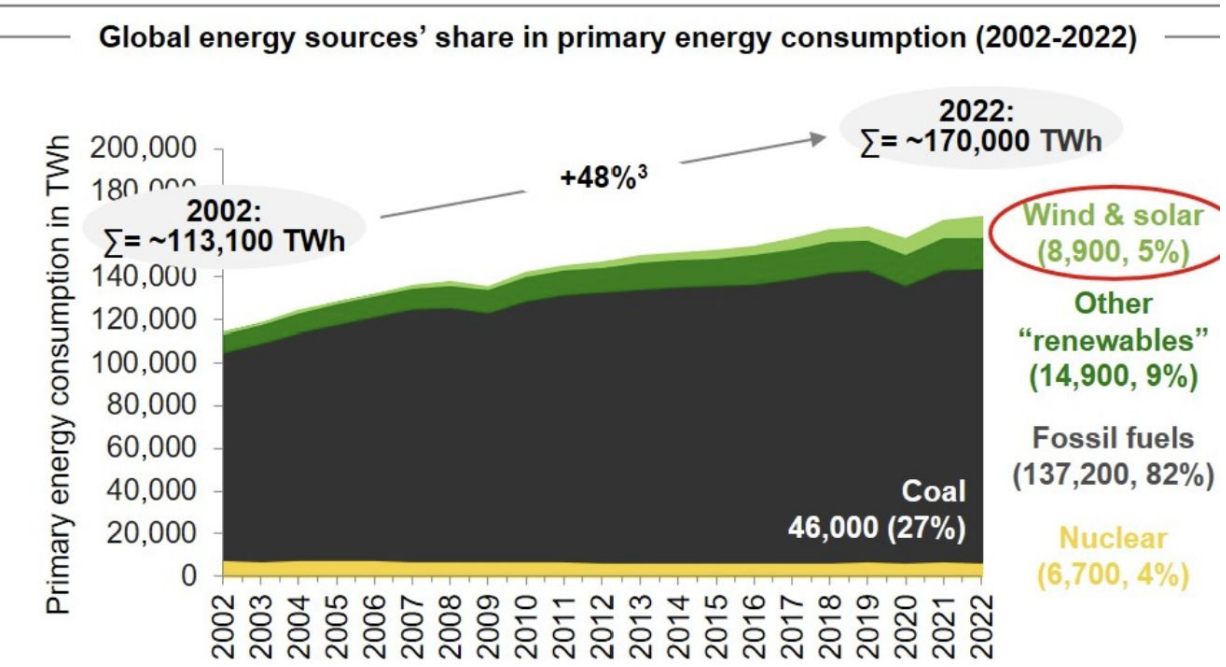
Albei was eintlik waterstofontploffings

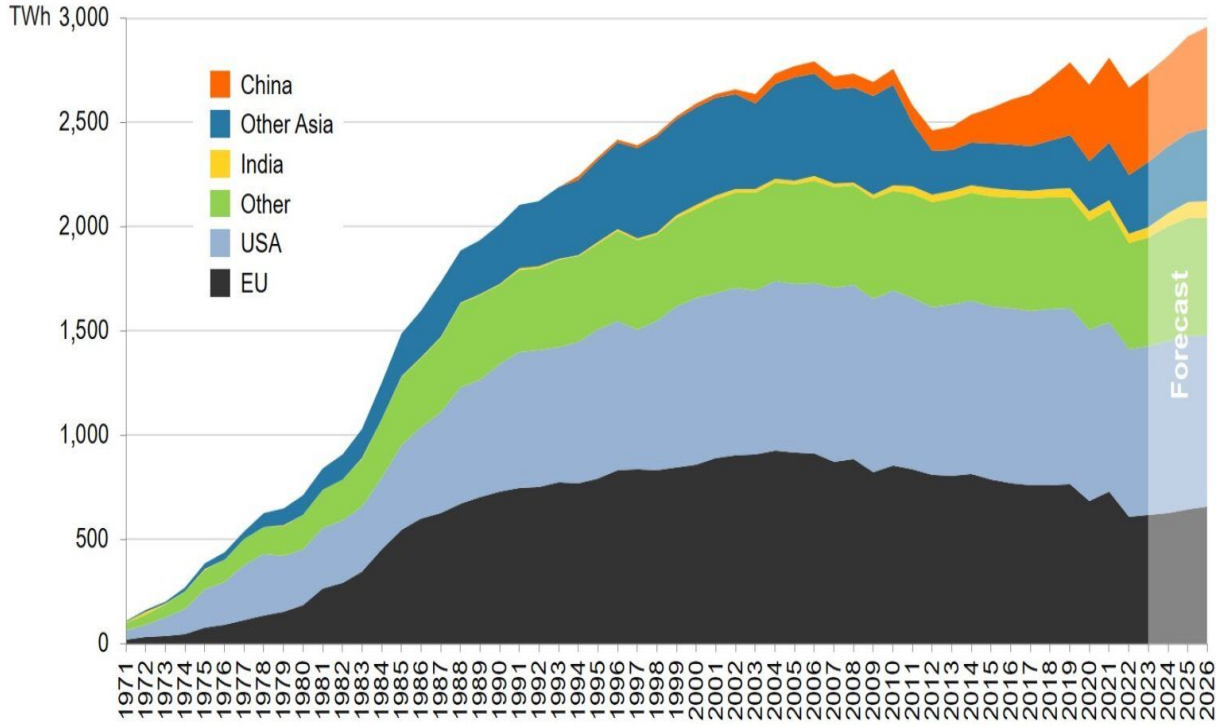


Grafiet
Swaer Water
Lig water

Water/Gas /Gesmolte Sout

Kernenergie as 'n bron van primêre energie wêreldwyd.





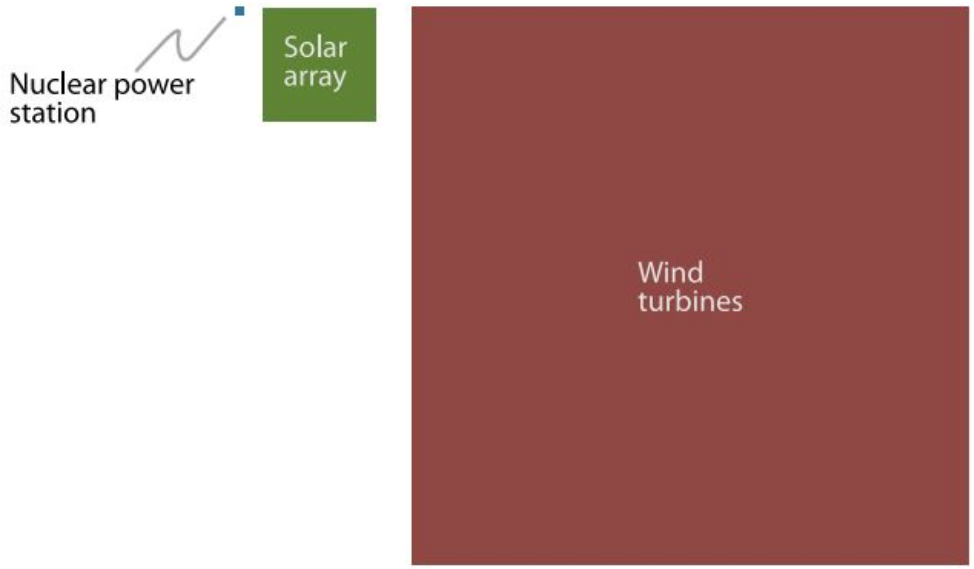
ernenergie is in relatiewe afname (was 10% 20 jaar gelede, af na 4% vandag in terme van primêre energie), maar dit bly konstant in absolute syfers, hoofsaaklik aangedryf deur die uitbreiding in China en Indië

The Nuclear Energy Conundrum

Table 1: Energy densities of different fuels

Technology	Energy density MJ/kg
Wind turbine	0.00006
Battery	0.001
Hydro	0.72
Wood	5.0
Petrol	50
Hydrogen	143
Nuclear fission	88,250,000
Nuclear fusion	645,000,000

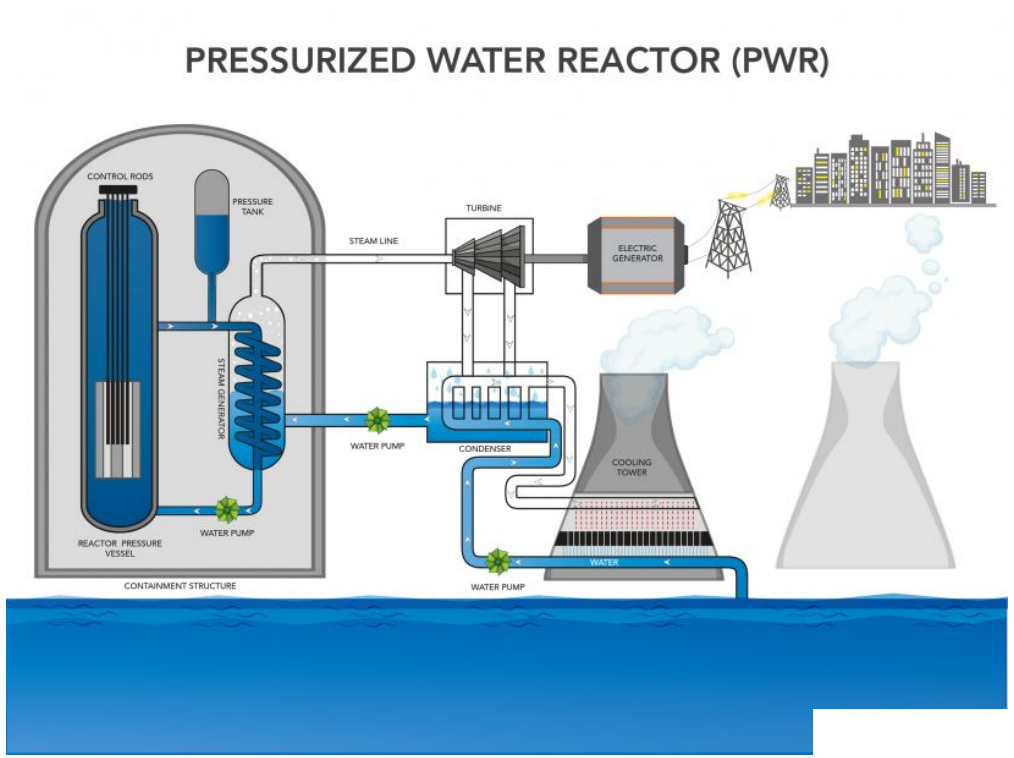
Source: M J Kelly, 'Lessons from technology development for energy and sustainability' *MRS Energy and Sustainability* 2016; 3: 2-13.

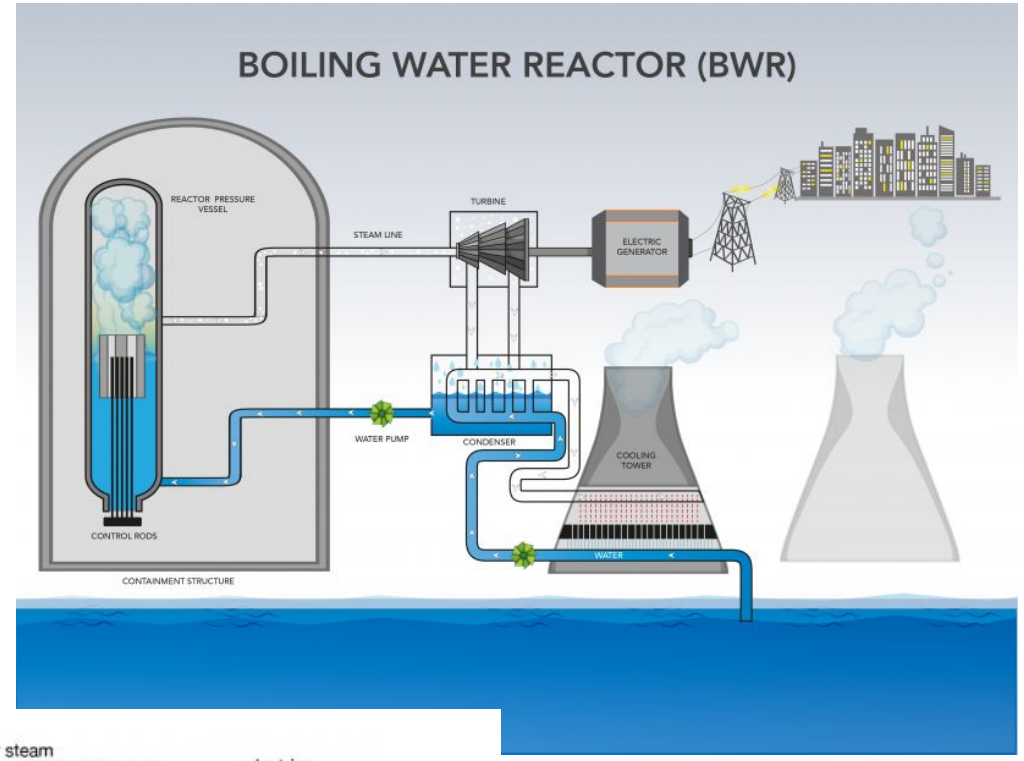


The Kernkragraaisel

Die ingenieurswese van energiedigtheid is daar [krag, energie, grond, ens.].
Maar dit beteken nie noodwendig dat dit ooreenstem met die sakegeval
[koste]. Hoekom?"

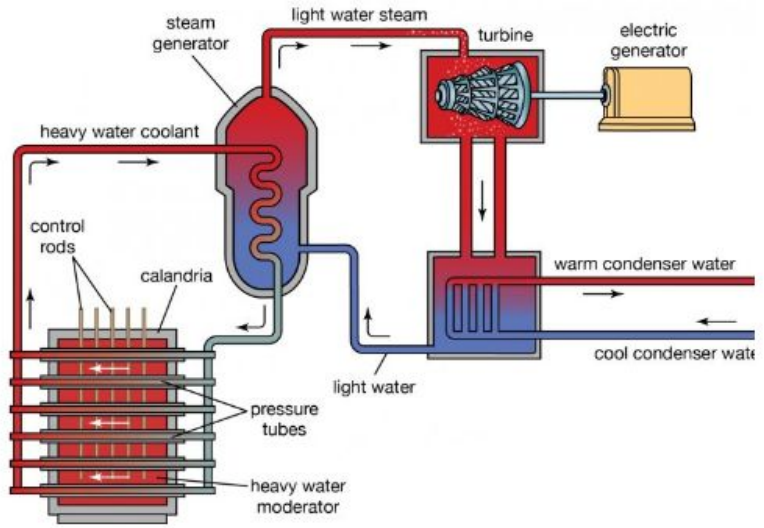
Ingenieursdoeltreffendheid impliseer nie noodwendig ekonomiese doeltreffendheid nie





Slegs drie groot tipes het kommersiële lewensvatbaarheid getoon:

- PWR (Drukwaterreaktor)
- BWR (Kookwaterreaktor)
- PHWR (DrukPERSWATER Reaktor)



DRUKPERSWATERREAKTOR (PHWR)

Die Kernenergie-raaisel

$$\mathrm{LCOE} = \frac{\text{sum of costs over lifetime}}{\text{sum of electrical energy produced over lifetime}} = \frac{\sum_{t=1}^{n} \frac{I_t + M_t + F_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}}$$

I_t : investment expenditures in the year t

M_t : operations and maintenance expenditures in the year t

F_t : fuel expenditures in the year t

E_t : electrical energy generated in the year t

r : discount rate

n : expected lifetime of system or power station

Note: caution must be taken when using formulas for the levelized cost, as they often embody unseen assumptions, neglect effects like taxes, and may be specified in real or nominal levelized cost. For example, other versions of the above formula do not discount the electricity stream. The real lifetime may be considerably longer or shorter than expected.

Geduldige Kapitaal is nodig, (gewoonlik staatsfinansiering, uitvoer-kredietagentskappe, IMF?? en WB??)

Gelykgestelde Koste van Elektrisiteit (LCOE)

Kernenergie word gedryf deur CAPEX en die afslagkoers, vergelykbaar met 'n huislening.

Daar is baie kritiek teen die LCOE, omdat dit nie die integrasiekoste, firma-koste, stilstand of die totale stelselkoste van elektrisiteit in ag neem nie.

Die Kernenergie-raaisel

https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx

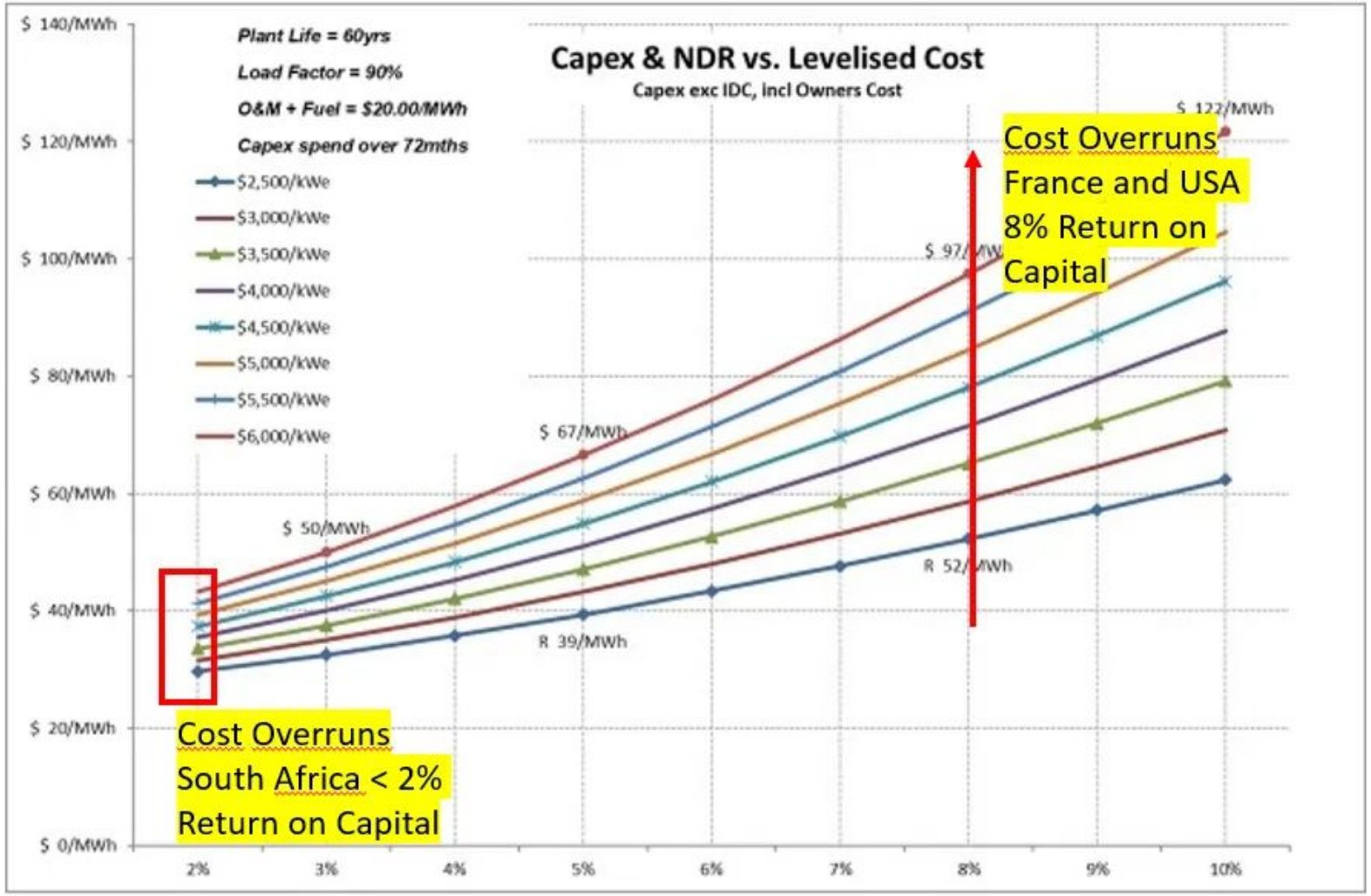
Projected nuclear LCOE costs for plants built 2020-2025, $/MWh

Country	At 3% discount rate	At 7% discount rate	At 10% discount rate
France	45.3	71.1	96.9
Japan	61.2	86.7	112.1
South Korea	39.4	53.3	67.2
Russia	27.4	42.0	56.6
Slovakia	57.6	101.8	146.0
United States	43.9	71.3	98.6
China	49.9	66.0	82.1
India	48.2	66.0	83.9

$50/MWH = R900/MWH = R0.90/kwh

$25/MWH = R450/MWH = R0.45/kwh - die koste van koeberg, omrede die lening reeds afbetaal is

Oorkoste! Die afslagkoers is die sleutelkriteria, geduldige kapitaal is nodig

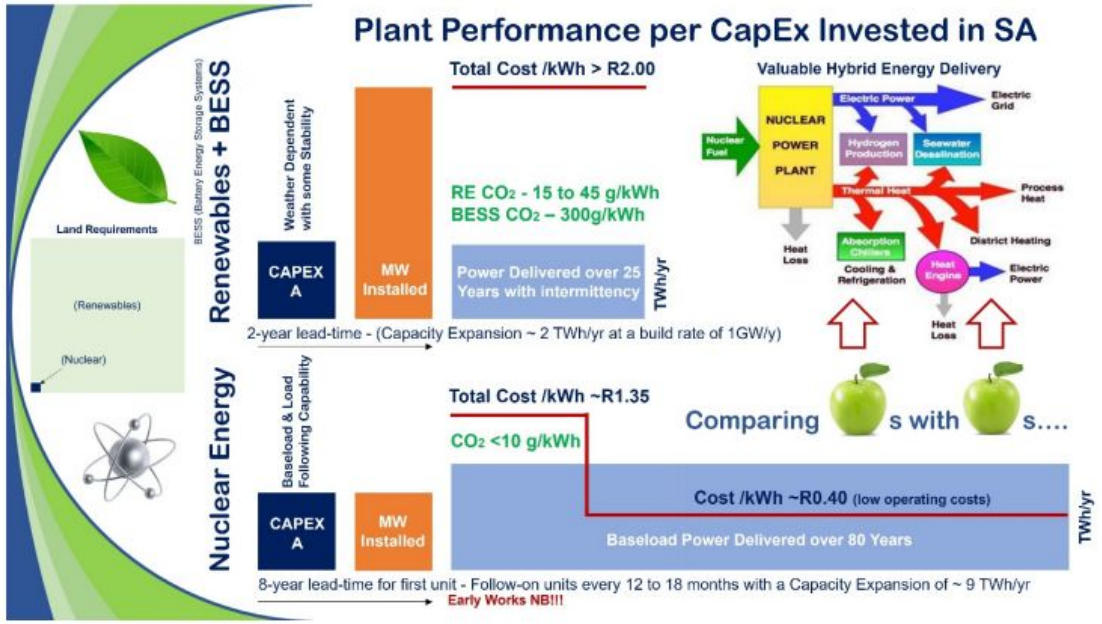


As die afslagkoers onder 3% is, is kernenergie mededingend met ander bronne, veral in die totaal (totale stelselkoste).

Privaat Beleggers se Perspektief
Sharpe se Verhouding

Die Sharpe-verhouding vertel beleggers dat vir 'n projek waar hulle slegs inkomste na 5-7 jaar terugkry, en breakeven na 15 jaar (die periode hang af van die rentekoers), die risiko om elders in die mark te belê 7 keer laer is.

Hoë Risiko, Hoë Opbrengs?



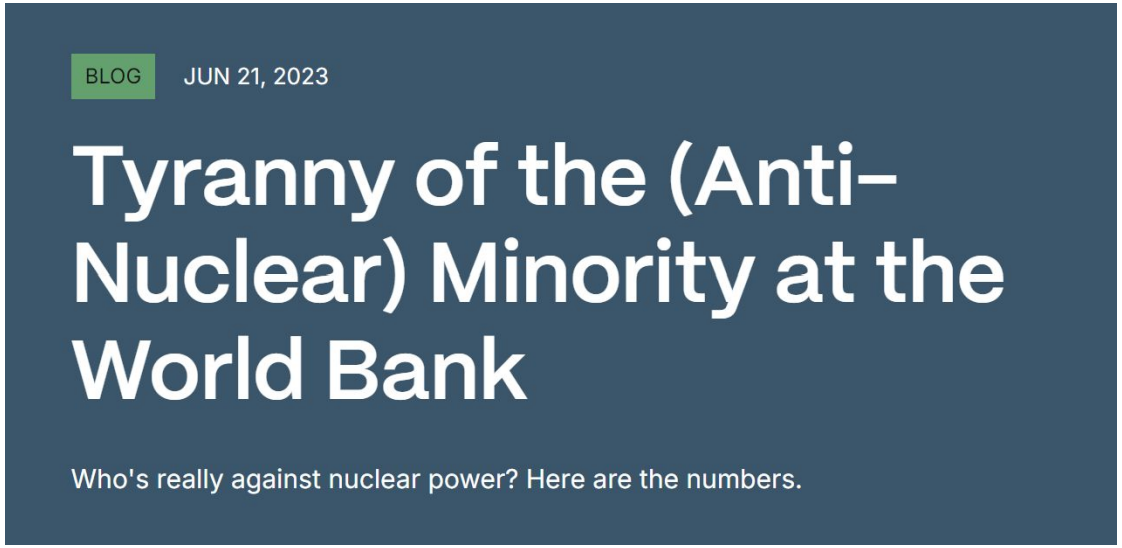
Grootste Risiko tydens Konstruksie?
Hoe bestuur jy daardie risiko?
Dra jou verskaffers daardie risiko?

Belangrike Kernkragsentrale in die VSA is voor die 1973 oliekrisis uitgebrei, terwyl Frankryk en Spanje die ander kant toe gegaan het deur staatsgedrewe uitbreiding om hulself teen nog ‘n olieskok te beskerm en soedoene onafhanlikheid kon beheer

yrannie van die (Anti-Kern) Minderheid by die Wêreldbank

Honderdelande wat meer as 80% van die Wêreldbank se stemmag verteenwoordig, het 'n direkte en aantoonbare belang in kernenergie. Slegs agt lande is aktief teenkern: Duitsland, Portugal, Italië, Oostenryk, Switserland, Denemarke, Ierland en Australië.
Wat het hierdie agt lande in gemeen?

- Almal is ryk lande
- Alle reeds hoë-energie verbruikers
- Geen staat op lenings of tegniese insette van die Wêreldbank nie

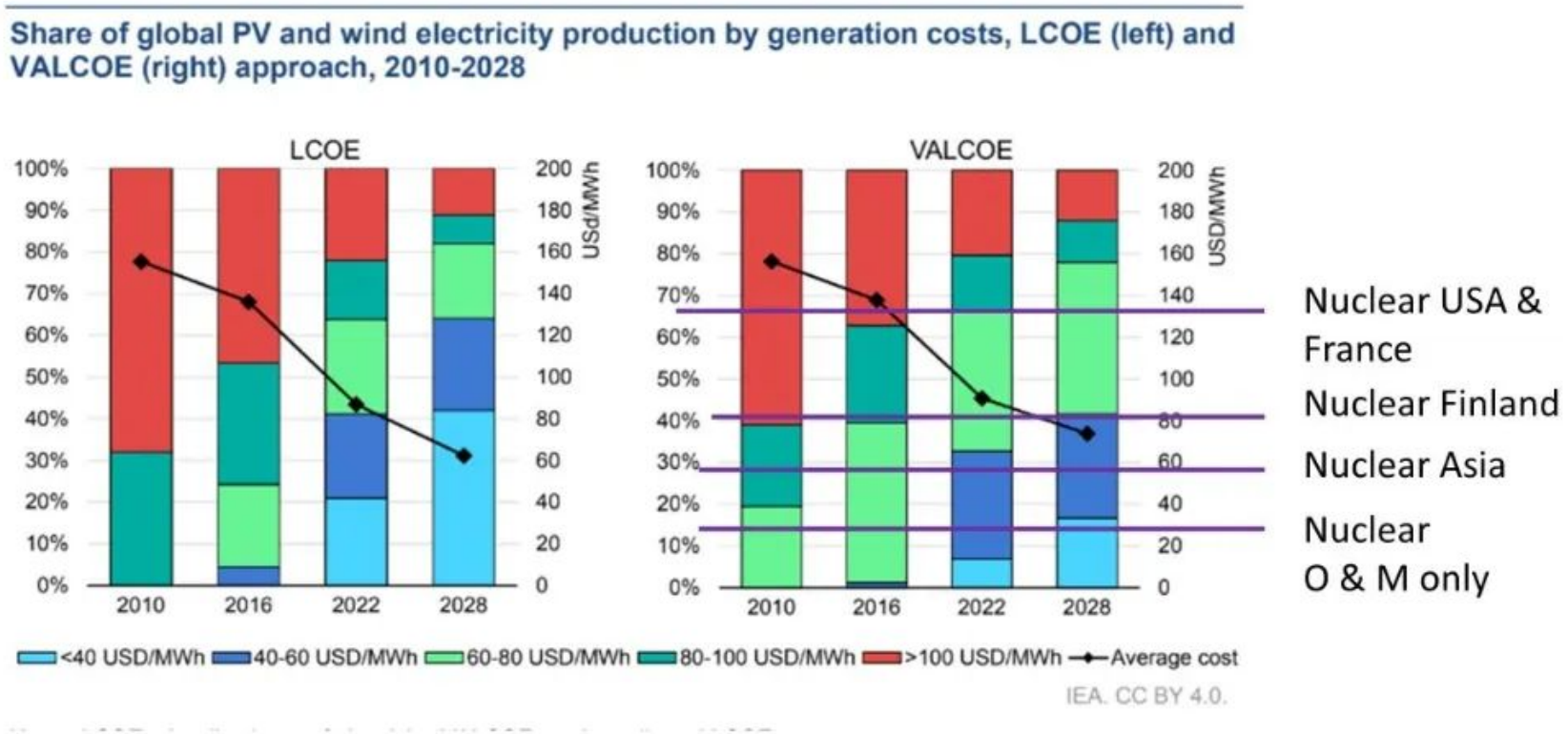


My vraag aan hierdie forum is:

Sal ons multinasionale instellings begin om kernenergie te bevonds?
Frankryk kan hier die grooste rol speel.

https://energyforgrowth.org/article/tyranny-of-the-anti-nuclear-minority-at-the-world-bank/

Hoe veraelvk Kernkraa met ander teanoloaieë?



Onder 'n 3% afslagkoers is kernenergie mededingend met ander bronne, veral in die totaal (totale stelselkoste)

Die koste van Hernubare Energie teenoor Kernenergie

https://hkrugertjie.substack.com/p/the-cost-of-renewables-vs-nuclear

IEA: The cost of Renewables vs Nuclear 2023 - 2028

CAPEX: Die Ekonomie van Kernenergie"

USA

Nuclear energy + Add to myFT

First new US nuclear reactor in three decades may be among the last

Opening of Georgia Power's Vogtle unit 3 comes seven years late and billions of dollars over budget

$30 miljard
2.3GW
$13/Watt

France

"EDF faces shouldering more of soaring bill for Hinkley Point"

REUTERS

Energy

EDF announces new delay and higher costs for Flamanville 3 reactor

By Benoit Van Overstraeten and Benjamin Mallet

January 12, 2022 2:30 PM GMT+1 - Updated 2 years ago

$32.7 miljard
3.26GW
$10/Watt

$12.7 miljard
1.6GW
$8/Wat

DW Made for minds. IN FOCUS Ukraine Moon Sniper Beethovenfest Latest videos

BUSINESS | FINLAND

Finland's much-delayed nuclear plant launches

03/12/2022

Nuclear reactor Olkiluoto 3 has gone online in Finland some 12 years behind schedule and on a massively inflated budget. Finland now hopes to cut back on energy imports from Russia, Sweden and Norway.

$11 miljard
1.650GW
$6.7/Watt

The Economics of Nuclear Energy

China

WORLD NEWS

Pakistan's Prime Minister Sharif launches $3.5 billion Chinese-designed nuclear energy project

$3.5 miljard
1.2GW
$2,9/Watt

India - PBWR

India's first indigenous 700 MWe nuclear plant starts in Gujarat; PM Modi calls 'milestone'

By Singh Rahul Sunilkumar | Edited by Aryan Prakash

Aug 31, 2023 09:13 PM IST

India's first indigenously developed 700 MWe nuclear power reactor at the Kakrapar Atomic Power Project in Gujarat starts operations.

5 units under construction and 10 more units planned, at a cost of ₹1.05 lakh crore (US$13 billion).

$13 miljard
7GW
$1.9/watt

Russia

ESI AFRICA

NEWS & COMMENTARY | RESOURCES | WEBINARS | MAGAZINE | ELITES | EVENTS

Home › Industry Sectors › Generation › Russia's Rosatom to install first power unit at nuclear plant in Egypt

Generation | International | News | North Africa

Russia's Rosatom to install first power unit at nuclear plant in Egypt

$30 miljard
4.8GW
$6/Watt

$6.25/Watt * R11.5/$ * 9.60GW
= R690 Billion

Dit neem nie eers ekonomie van skaal aan nie

South Korea

Barakah, UAE: Grid Connection of First Commercial Reactor in the Arab World

$24.4 miljard
5.6GW
$4/Watt

S.Korea wins $2.25 bln order to build nuclear power plants in Egypt

Rand to Dollar in 2014: 11.5:1

ARTICLE / 7 OCT 2011

Battle for South Africa's R1-trillion nuclear contract

By Lionel Faull

Kernenergie teenoor ander energiebronne

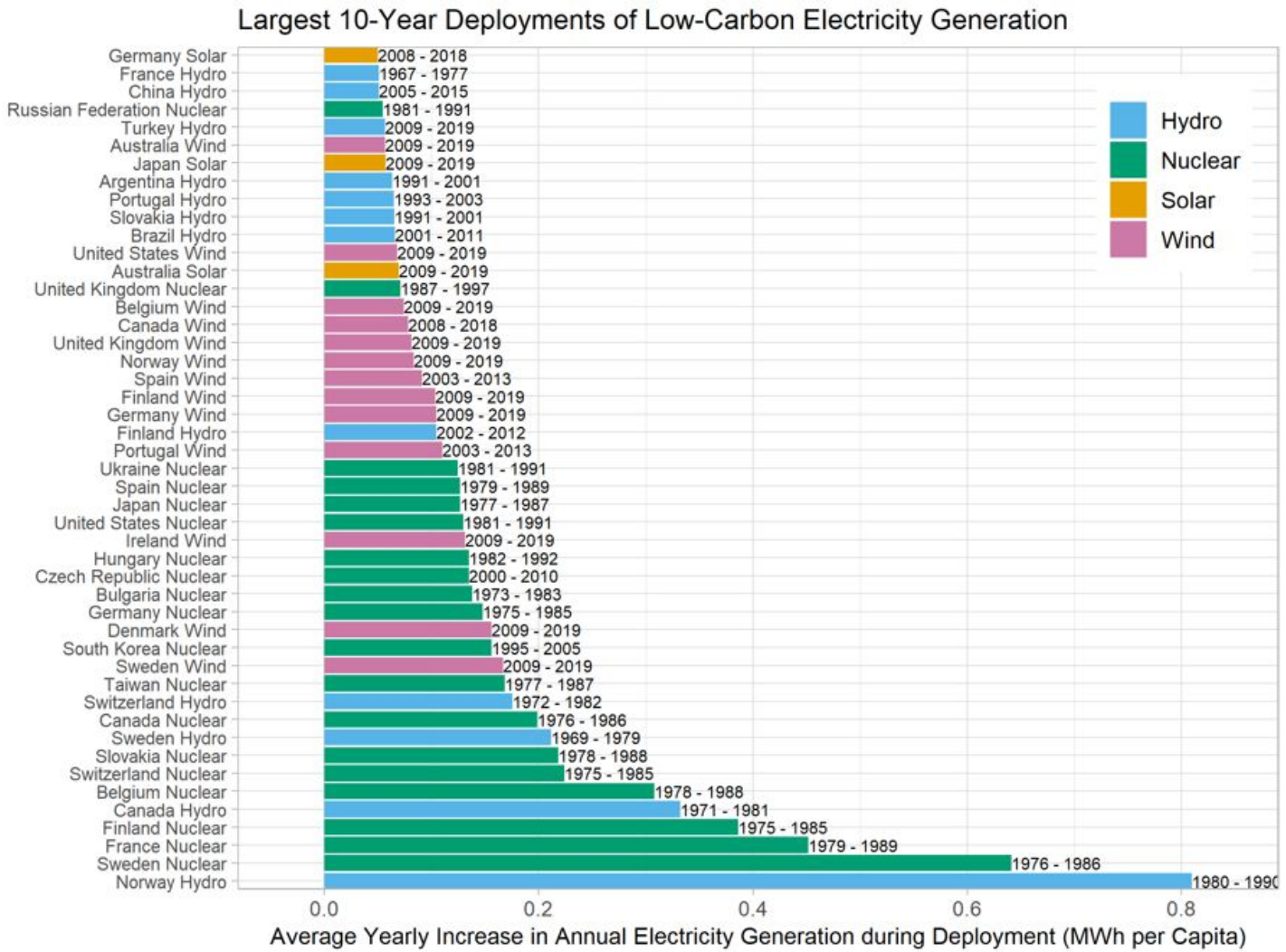
How fast can nuclear be deployed compared to RE?

Kernenergie kan opskaal, as dit op massa-produksie is, histories vinniger as hernubare energie

Grote bouprojekte sal voordele van skaalvoordele bied,

MAAR

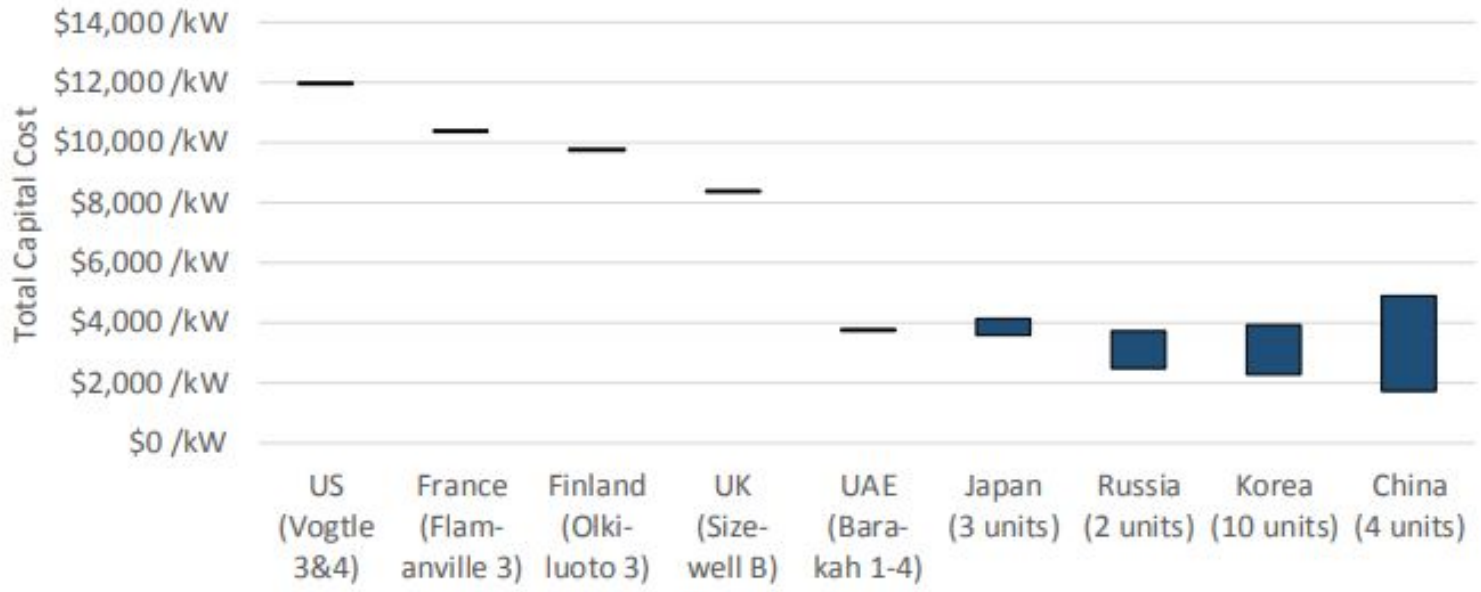
dit vereis geduldige kapitaal en politieke verbintenis.



Die koste van lopende projekte (2019)

Onthou 3 nommers!
$10, $6 and $3 per We
$10k, $6k and $3k per kWe
$10M, $6M and $3M per MWe
$10Mj., $6Mj. and $3Mj. per GWe

Figure 1. Total Capital Costs for Historical and Ongoing Nuclear Projects in Database



https://www.eti.co.uk/library/the-eti-nuclear-cost-drivers-project-summary-report

Westerse lande het vergeet hoe om te bou?

Franse uitsondering?

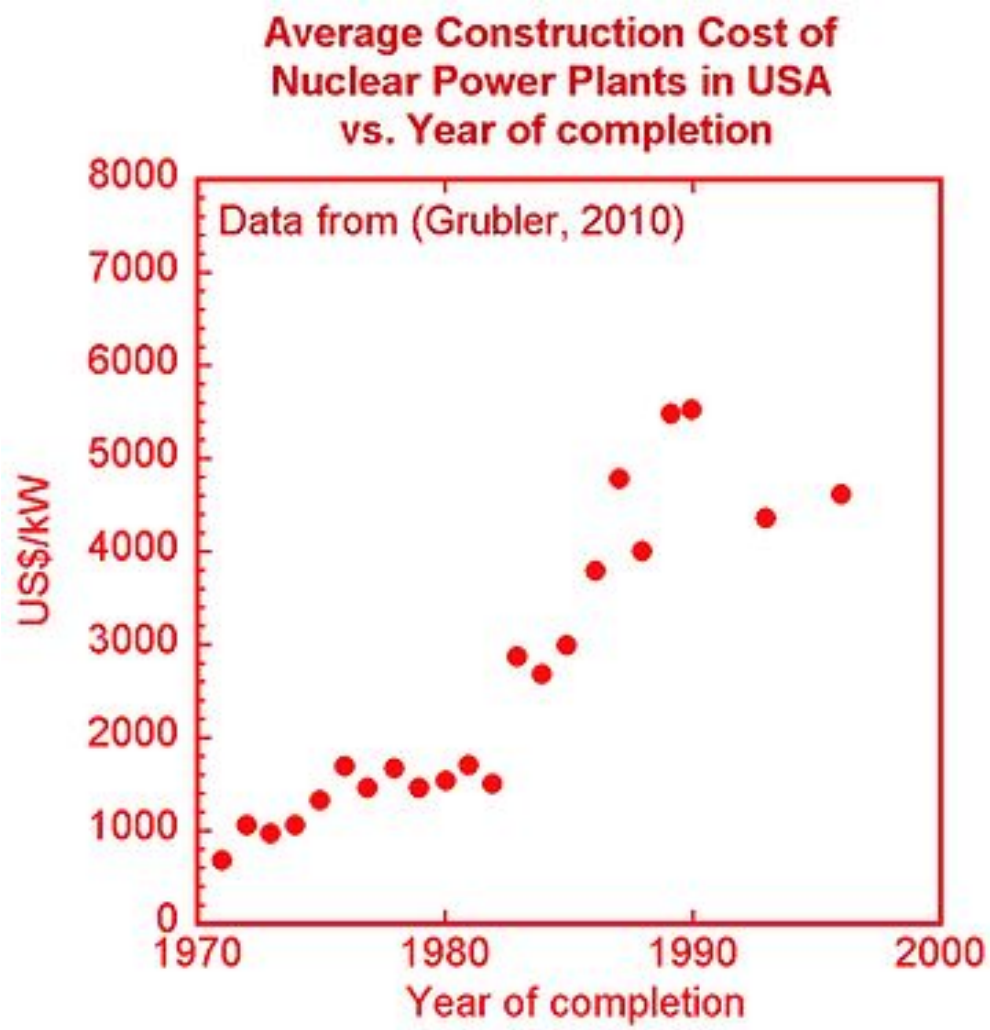
Asiatiese lande lyk of hulle weet wat hulle doen?

Die koste van historiese projekte

Bou koste in die Wes was in die 1980's dieselfde as in China en Indië vandag?

Die westerse lande het gebou teen minder as $3/We tot na Three Mile Island en Tsjernobyl.

Vrees veroorsaak politieke onsekerheid, onsekerheid lei tot vertragings, en vertragings resulteer in koste-oorlopies!

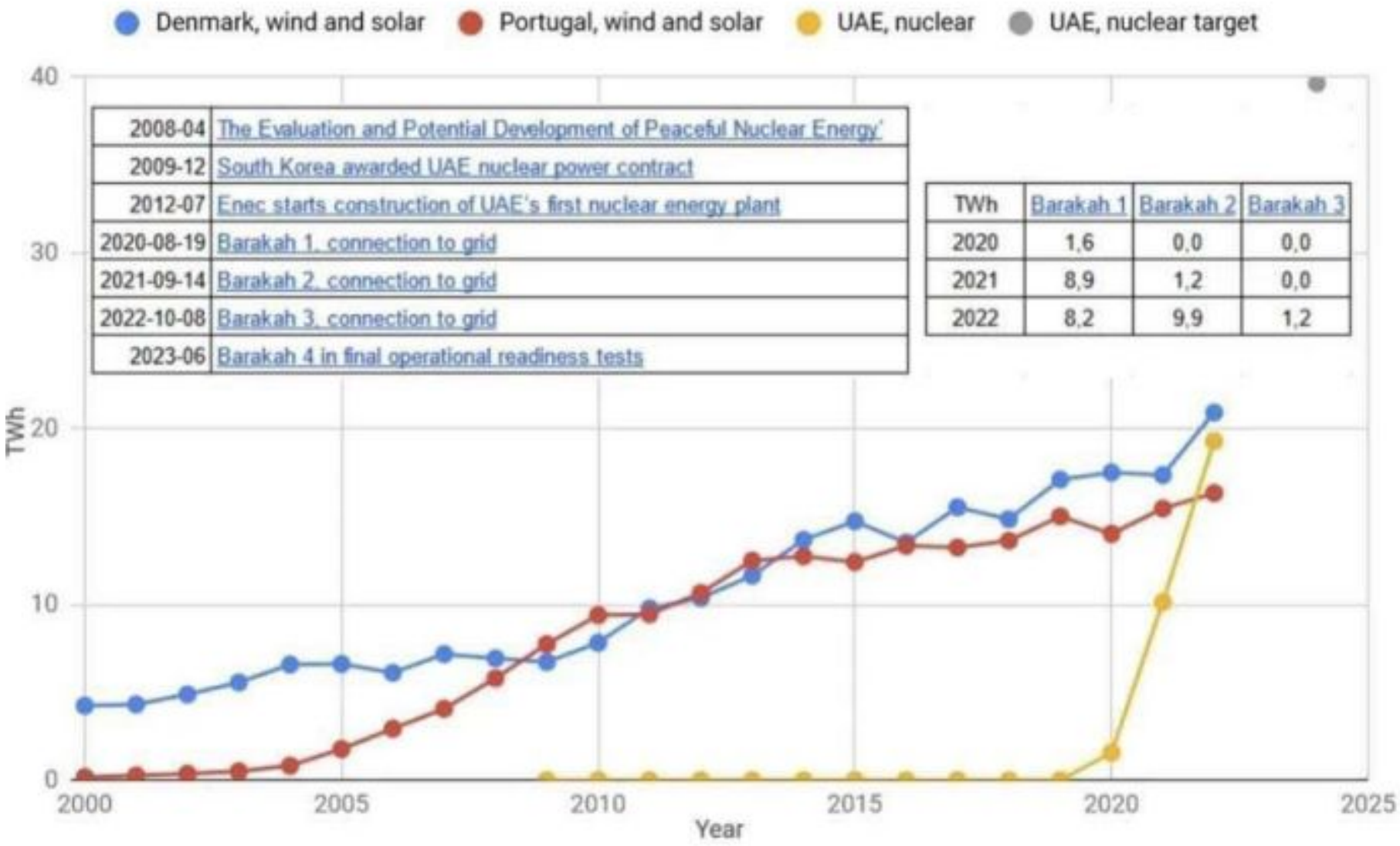


https://www.x-lnt.org/

Kernenergie teenoor ander energiebronne

Met 1 kragsentrale het die VAE meer elektrisiteit aan die netwerk bygevoeg as wat Portugal en Denemarke onderskeidelik in 20 jaar gedoen het.

150 Suid-Afrikaners was deel van die span.

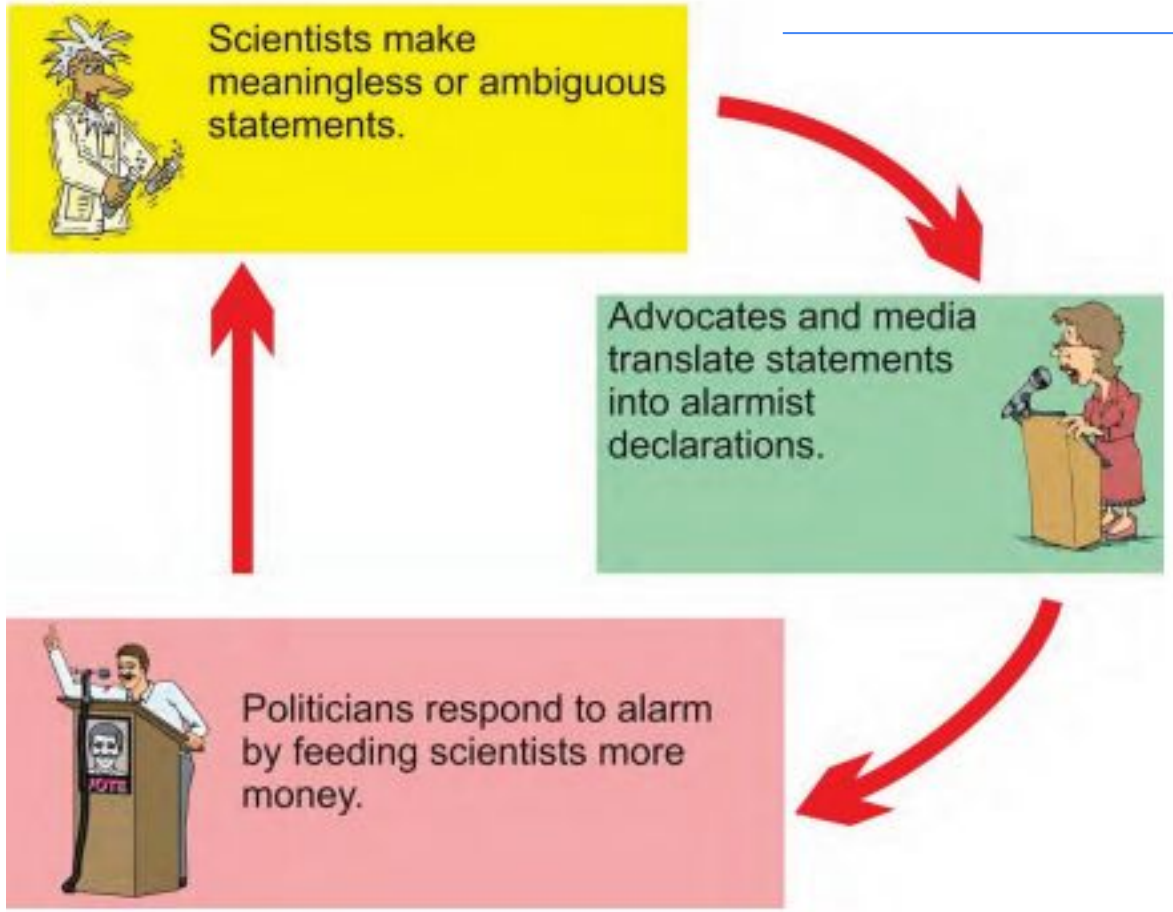


2008-04	The Evaluation and Potential Development of Peaceful Nuclear Energy'
2009-12	South Korea awarded UAE nuclear power contract
2012-07	Enec starts construction of UAE's first nuclear energy plant
2020-08-19	Barakah 1, connection to grid
2021-09-14	Barakah 2, connection to grid
2022-10-08	Barakah 3, connection to grid
2023-06	Barakah 4 in final operational readiness tests

TWh	Barakah 1	Barakah 2	Barakah 3
2020	1,6	0,0	0,0
2021	8,9	1,2	0,0
2022	8,2	9,9	1,2

Radiophobie: Reguleringshervorming:
Waarom het koste in die VSA en Frankryk duur geword?

Die Ysterdriehoek en die Rysbak



bbc.com/news/world-asia-66610977

By Navin Singh Khadka
Environment correspondent, BBC World Service

Japan has begun releasing treated radioactive water from its damaged Fukushima power plant into the Pacific Ocean - 12 years after a nuclear meltdown.

That's despite China slapping a ban on Japanese seafood and protests in Japan itself and South Korea.

The UN's atomic regulator says the water will have "negligible" radiological impact on people and the environment.

But is it safe?

An earthquake followed by a tsunami in 2011 wrecked the nuclear power plant, destroying its cooling system and causing reactor cores to overheat and contaminate water within the facility with highly radioactive material.

Since the disaster, power plant company Tepco has been pumping in water to cool down the reactors' fuel rods. This means every day the plant produces contaminated water, which is stored in more than 1,000 tanks, enough to fill more than 500 Olympic swimming pools.

Japan says it needs the land occupied by the tanks to build new facilities to safely decommission the plant. It has also raised concerns about the consequences if the tanks were to collapse in a natural disaster.

- **What happened at Fukushima 12 years ago?**

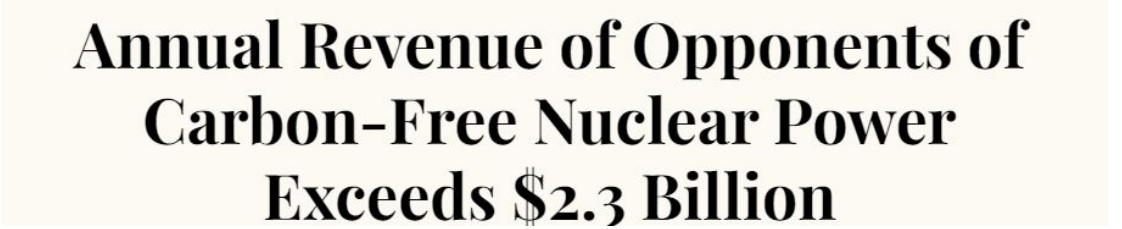
Radiophobie, Die Aktiviste, die NGO Industriële Komplex.

Op die hoogtepunt van die Koue Oorlog, die Viëtnamoorlog, die bedreiging van 'n totale kernoorlog en die nuut opkomende omgewingsbewustheid is ek in 'n radikale omgewingsaktivis verander. Terwyl ek my PhD in ekologie in 1971 gedoen het, het ek by 'n groep aktiviste aangesluit wat begin het om in die kelder van die Unitarian Church te vergader om 'n protesvaart teen die VSA se waterstofbomtoetse in Alaska te beplan. Ons het bewys dat 'n ietwat rommelige groep aktiviste 'n ou vissersboot oor die noordelike Stille Oseaan kon seil en die loop van die geskiedenis kon verander. Ons het 'n fokuspunt geskep vir die media om verslag te doen oor publieke teenstand teen die toetse. Toe daardie H-bom in November 1971 ontplof, was dit die laaste waterstofbom wat die Verenigde State ooit ontplof het. Alhoewel daar vier verdere toetse in die reeks beplan was, het president Nixon hulle gekanselleer weens die publieke teenstand wat ons gehelp het om te skep. Dit was die geboorte van Greenpeace." – Dr. Patrick Moore

Oliver Stone's se Fliek "Nuclear Now"

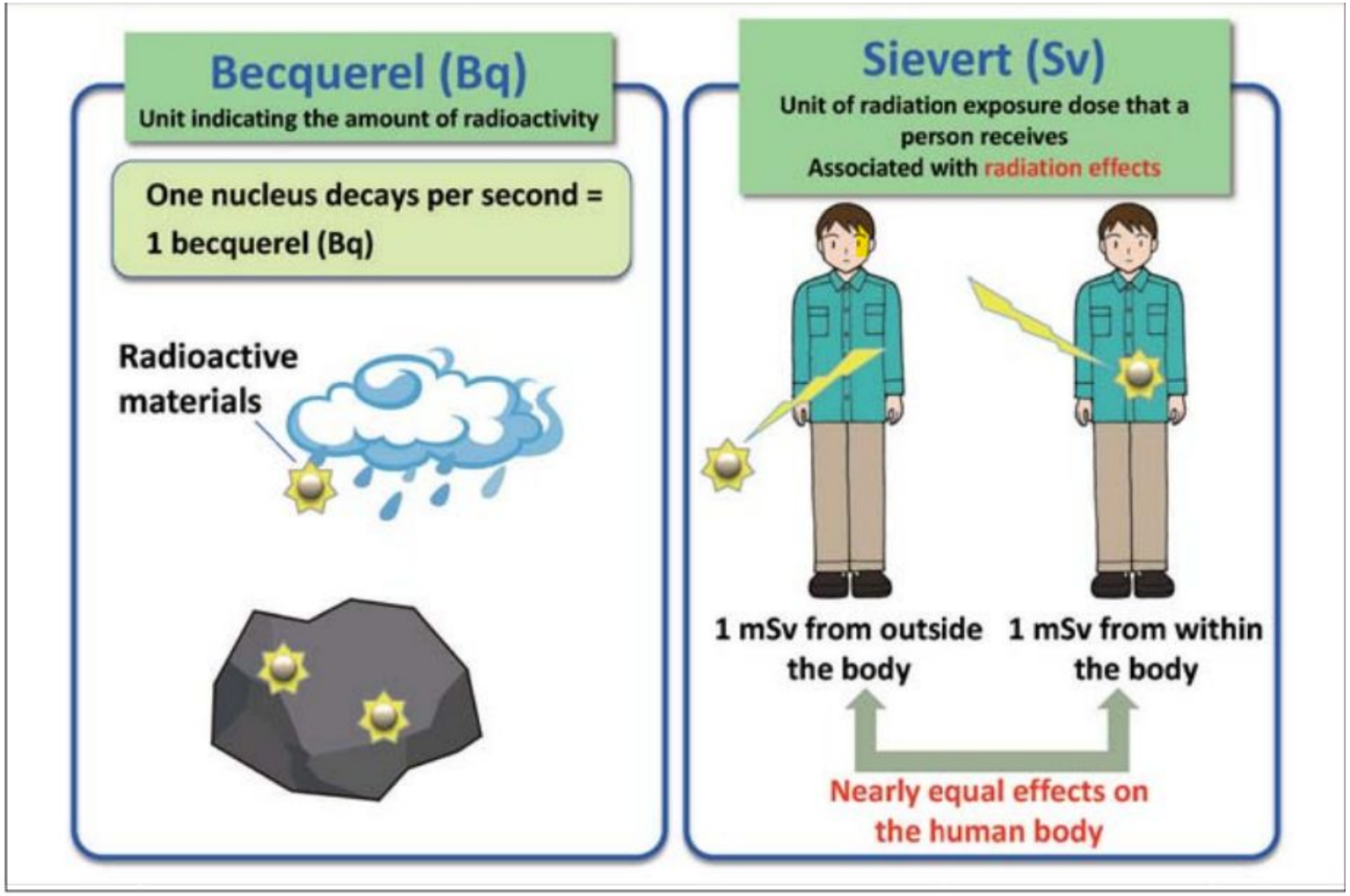
"Sien ook my onderhoud met Andy May getiteld:"

"Greenpeace's crimes and lies"
https://clintel.org/greenpeace-crimes-and-lies-updated/



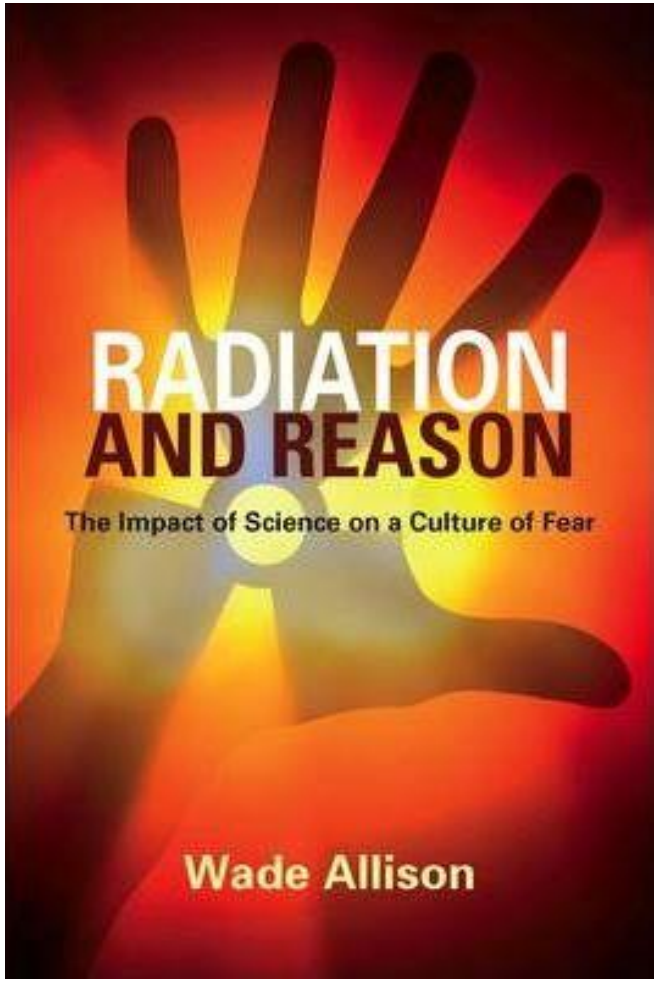
https://capitalresearch.org/article/annual-revenue-of-opponents-of-carbon-free-nuclear-power-exceeds-2-3-billion/

Radiophobie: Veiligheid: Eenhede van Straling



1 Sv = 1 joule/kilogram – 'n biologiese effek. Die sievert verteenwoordig die ekwivalente biologiese effek van die deponeering van 'n joule stralingenergie in 'n kilogram menslike weefsel.

Die oorkoming van regulerende en politieke hindernisse vir kernenergie, veral die vrees vir bestraling.



https://hkrugertjie.substack.com/p/nuclear-safety-the-lnt-folly

Ons moet die lineêre geen-drempelmodel (LNT) uitdaag.
Ionerende straling is 'n swak Carcinogeen

Radiophobie: Tsjernobil?

As straling gevaarlik is, hoekom floreer die diere? Hulle is ook soogdiere!

The true death toll of the Chernobyl disaster is difficult to judge because of the long-lasting health effects of radioactive pollution. The official death toll directly attributed to Chernobyl that is recognized by the international community is just 31 people with the UN saying it could be 50. Mar 4, 2022

as.com
https://en.as.com › Latest news

How big was Chernobyl, how many people died, and how far ...

Radiophobie: Vergelyk met natuurlike gas-ongelukke?

LNG het eintlik 'n baie goeie rekord.

Groot ongeluk in JANUARIE 2004 in Algerië.

Die Skikda-ongeluk in Algerië het gelei tot baie veiligheidsstandaarde wat in die industrie aanvaar is; dit het 27 mense se dood, 72 beseerdes en sewe vermiste mense tot gevolg gehad; 2004.

Radiophobie: Fukushima?

Fukushima Daiichi Accident

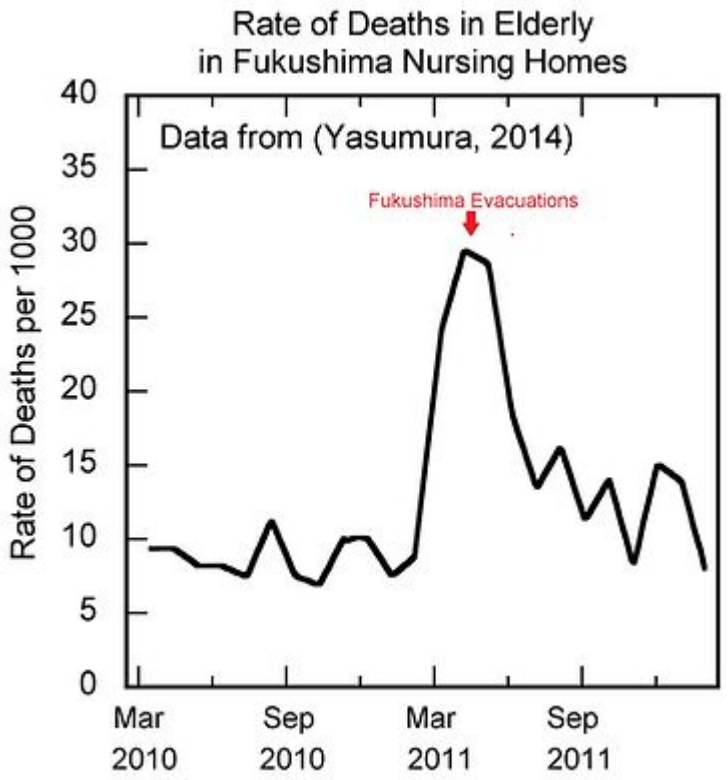
(Updated January 2023)

- Following a major earthquake, a 15-metre tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing a nuclear accident beginning on 11 March 2011. All three cores largely melted in the first three days.
- The accident was rated level 7 on the International Nuclear and Radiological Event Scale, due to high radioactive releases over days 4 to 6, eventually a total of some 940 PBq (I-131 eq).
- All four Fukushima Daiichi reactors were written off due to damage in the accident – 2719 MWe net.
- After two weeks, the three reactors (units 1-3) were stable with water addition and by July they were being cooled with recycled water from the new treatment plant. Official 'cold shutdown condition' was announced in mid-December.
- Apart from cooling, the basic ongoing task was to prevent release of radioactive materials, particularly in contaminated water leaked from the three units. This task became newsworthy in August 2013.
- There have been no deaths or cases of radiation sickness from the nuclear accident, but over 100,000 people were evacuated from their homes as a preventative measure. Government nervousness has delayed the return of many.
- Official figures show that there have been 2313 disaster-related deaths among evacuees from Fukushima prefecture. Disaster-related deaths are in addition to the about 19,500 that were killed by the earthquake or tsunami.

The Great East Japan Earthquake of magnitude 9.0 at 2:46 pm on Friday 11 March 2011 did

Ontruimings veroorsaak bevolkingsstress en dit veroorsaak sterftes?

RadioPhobia: Fukushima?



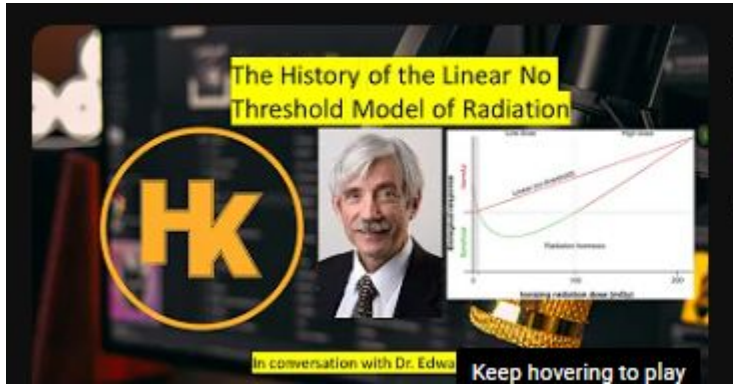
- Niks het van straling by Fukushima gesterf nie (miskien 1, die Japannese regering het slegs 1 geval vergoed).
- Maar pieksterftes het tydens die ontruimings plaasgevind.
- Die ontruimings self het 2 313 voortydige sterftes veroorsaak, met 90% van hulle in mense van 66 jaar en ouer.

Die kernreguleerders moet aanvaar dat te veel konserwatismus, gedryf deur vrees, gevolge het.

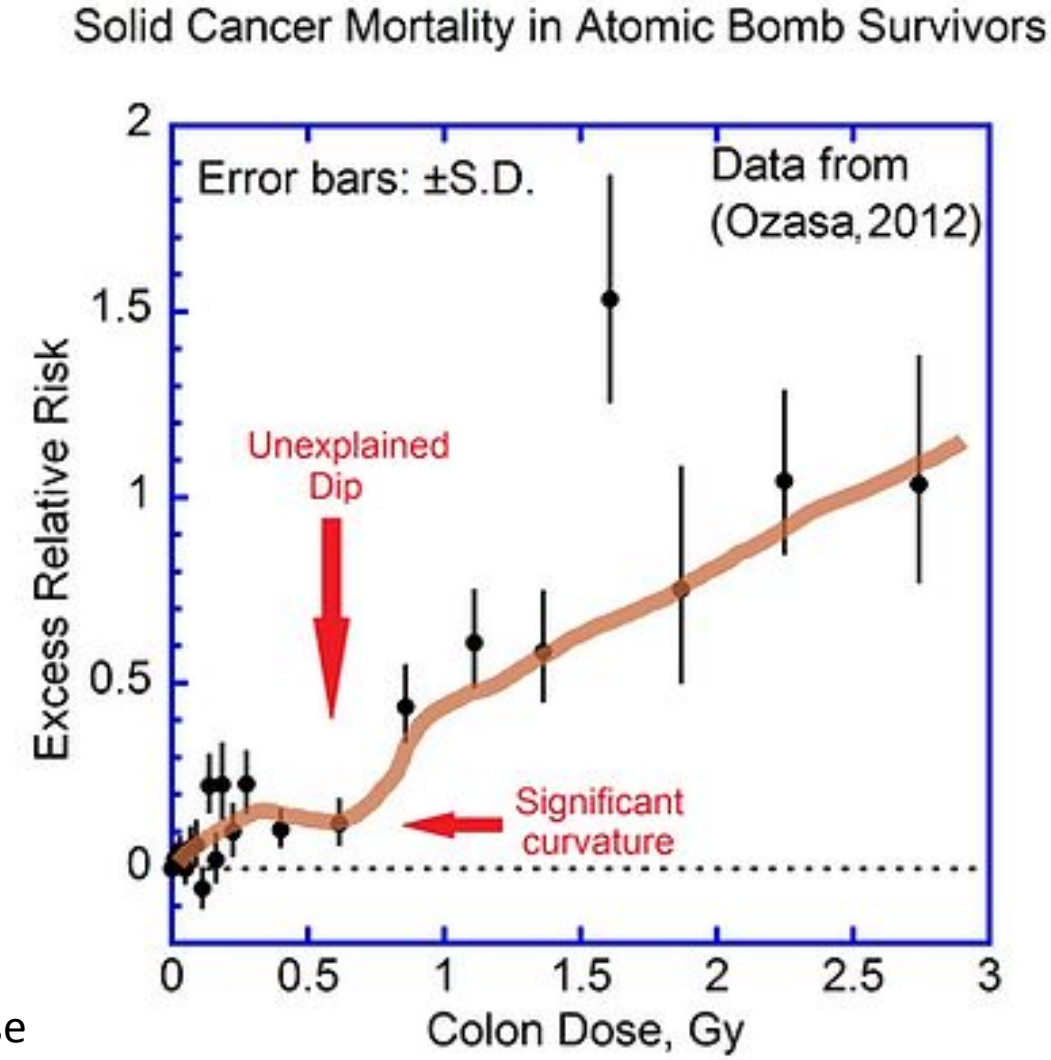
Blootstelling aan lae dosis en hoë dosis straling kan nie moontlik dieselfde wees nie; anders sal radioterapie nie werk nie

Hoe het die huidige teorie aanvaar geword?

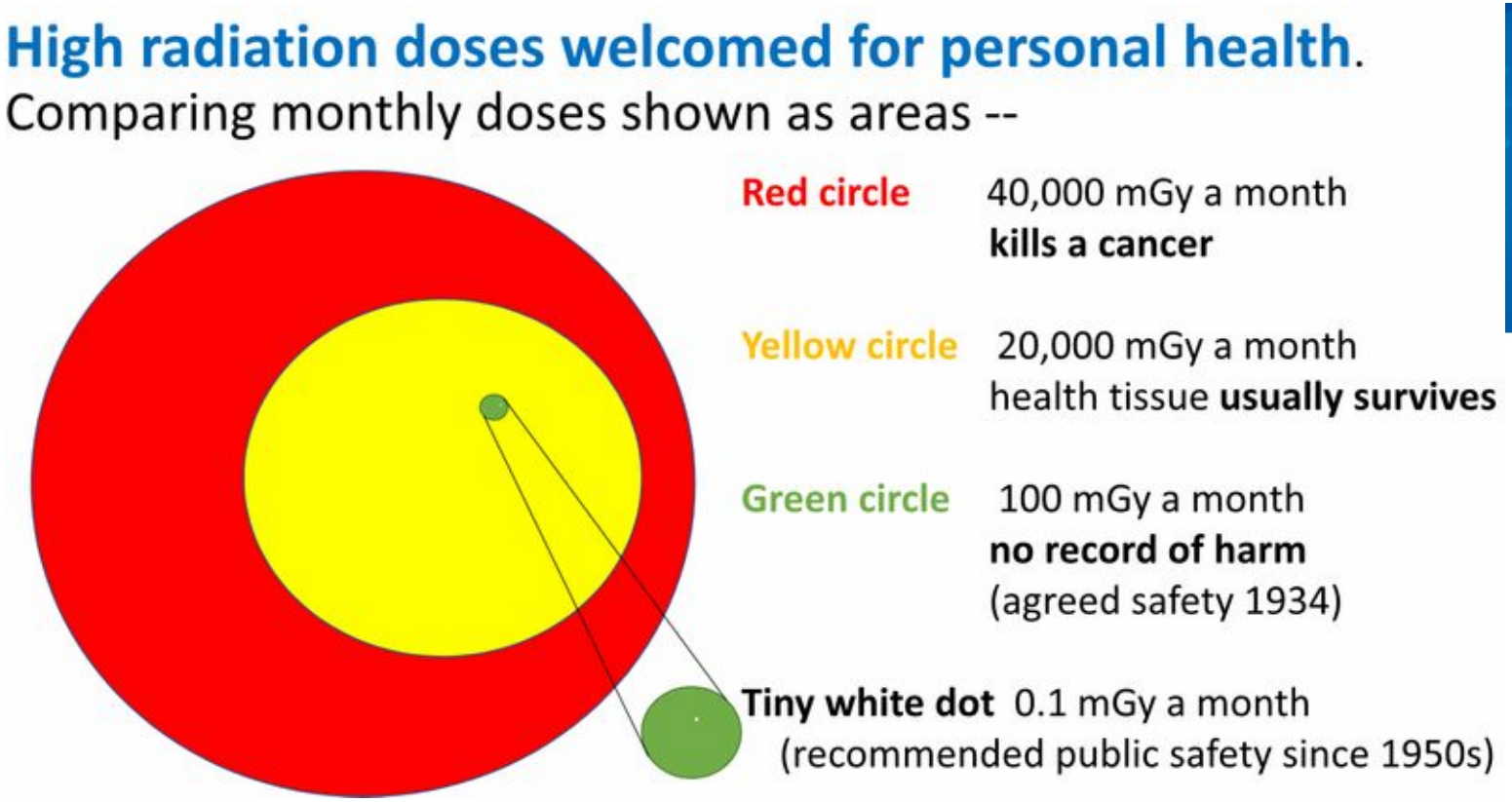
- In die 1950's het die BAERS-komitee na stralingneerslag gekyk.
- Die komitee is beman met politiek aangestelde genetici. Geld van die oliebedryf was betrokke.
- Die komitee het hulle aanbevelings gebaseer op 'n paar vrugvlieë en nie op die werklike data van die atoombomb survivors nie.



Dr. Edward Calabrese



Wat was die standaarde voor ALARA?



Source: Dr. Wade Allison
Aanbieding: House of Lords

Viewpoint: We should stop running away from radiation

26 March 2011

By Wade Allison
University of Oxford

Mense is bekommerd oor straling omdat hulle dit nie kan voel nie. Egter, die natuur het 'n oplossing - in onlangse jare is gevind dat lewende selle hulself op verskillende maniere vervang en herstel om van 'n dosis straling te herstel.

Hierdie slim meganismes tree binne ure in werking en faal selde, behalwe wanneer hulle oorlaai word - soos by Tsjernobyl, waar die meeste van die noodwerkers wat 'n dosis groter as 4,000 mSv oor 'n paar uur ontvang het, binne weke gesterf het

However, pasiënte wat 'n kursus radioterapie ontvang, kry gewoonlik 'n dosis van meer as 20,000 mSv na lewensbelangrike gesonde weefsel naby die behandelde tumor. Hierdie weefsel oorleef slegs omdat die behandeling oor baie dae versprei word, wat gesonde selle tyd gee om te herstel of vervang te word.

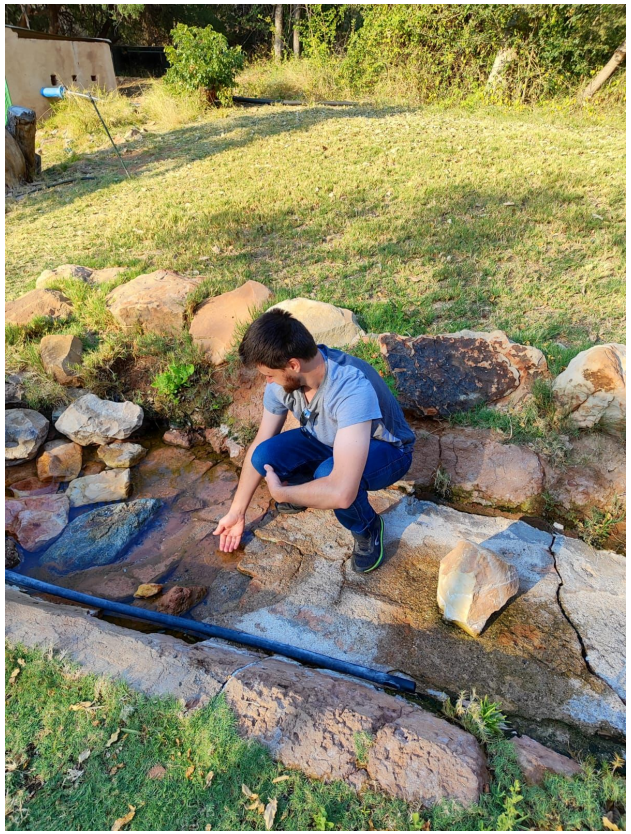
Op hierdie manier geniet baie pasiënte verdere waardevolle jare van hul lewe, selfs nadat baie lewensbelangrike organe die ekwivalent van meer as 20,000 jaar se dosis ontvang het teen die bogenoemde internasionaal aanbevole jaarlikse limiet - wat hierdie limiet onredelik maak.

Yazdan Taleshi (یزدان طالشی), 'n 80-jarige man wat in 'n agtergrondstralingsvlak van 250 millisieverts per jaar woon.

Kernkragsentrale veiligheid is 10 millisieverts per jaar!

Ek behoort dood te wees!

Tsipise Suid-Afrika: Waarom is Venda so Groen?

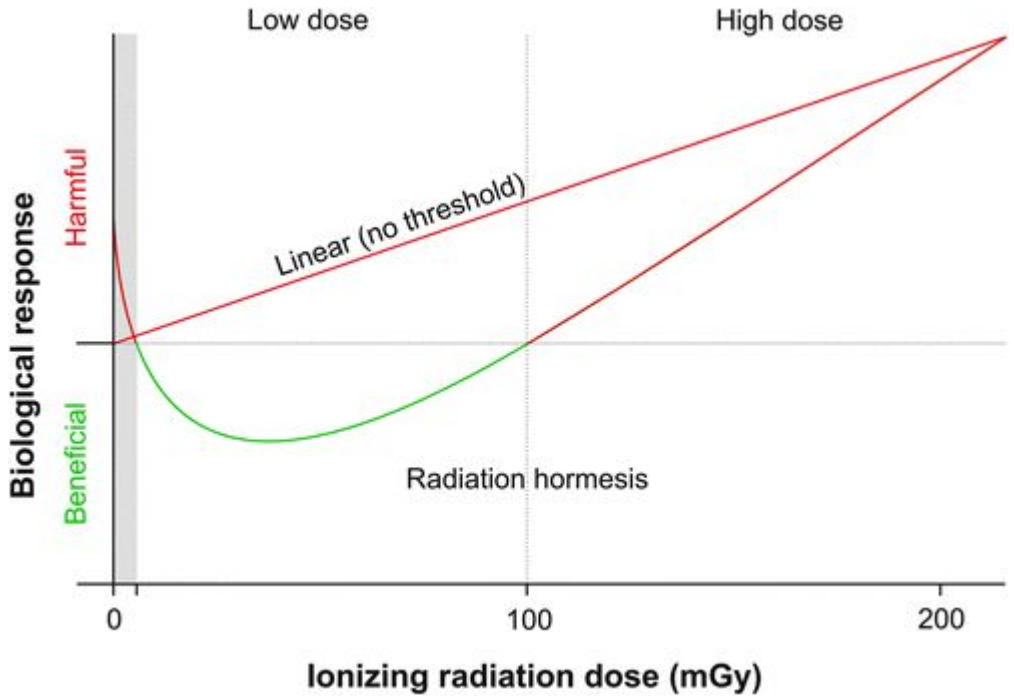


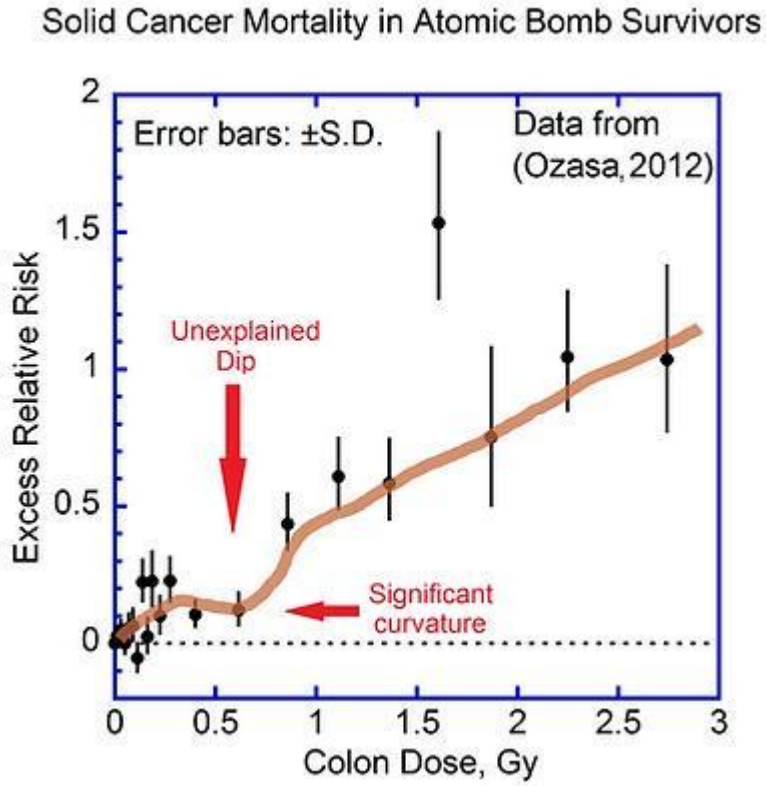
Estimating geothermal and background radiation hotspots from primordial radionuclide concentrations in geology of South Africa

Jacques Bezuidenhout

Radioaktiewehormese
Stranlingshormese

Als genesing plaasvind, is lineariteit duidelik verkeerd!





- Die voorsorgbeginsel het geen geldige wetenskaplike basis nie; dit is 'n reglike argument
- Ons moet dit vervang met ‘n EWEREDIGHEIDSBEGINSEL

Atoombom Slagoffers

Duitsland: Die behoefte aan krag betroubaarheid

Waarom is Ramsar en Venda nie 'n giftige-verlategebied nie?

Waarom is Tsjernobyl nie 'n giftige-verlategebied nie?

Waarom is Fukushima nie 'n giftige-verlategebied nie?

Waarom betaal die Duitse mediese fonds vir warmbronne en sluit hulle tog kernkrag af?

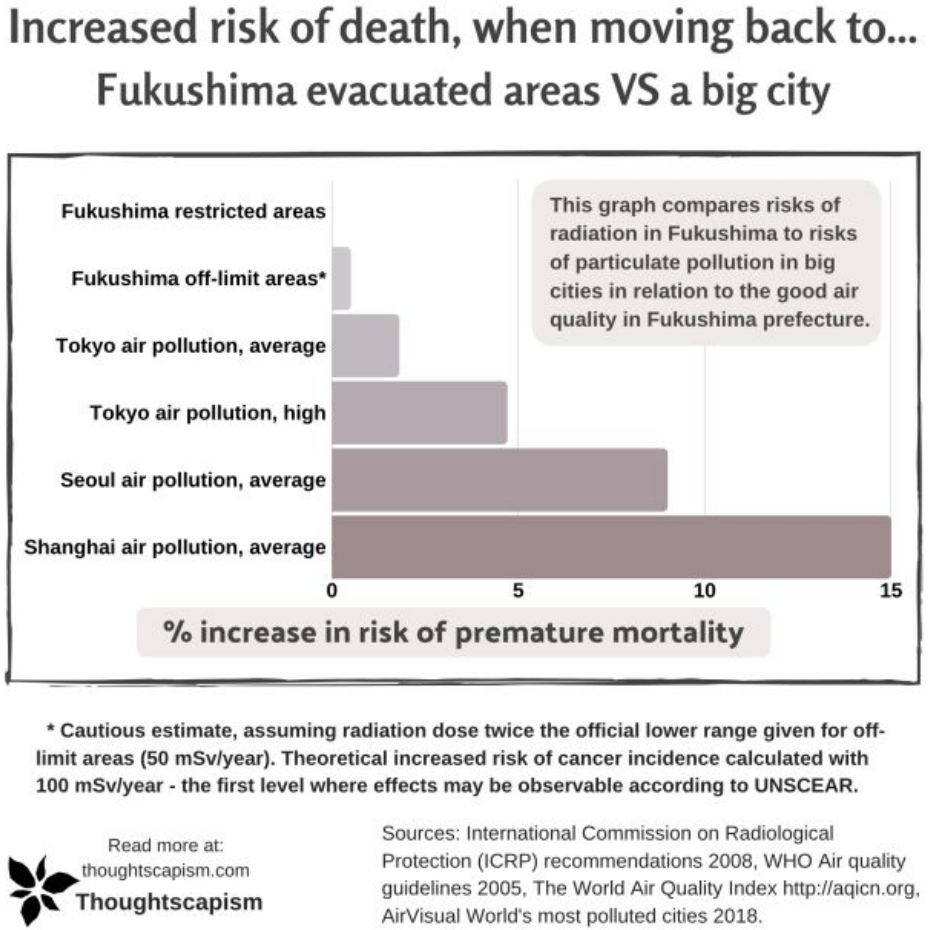
RADIANT ENERGY GROUP

Search...

Restart of Germany's Reactors: Can it be Done?

July 2023

Herstart van agt van Duitsland se reaktors kan meer as 85TWh elektrisiteit jaarliks byvoeg teen 'n bedryfs koste van €25/MWh."



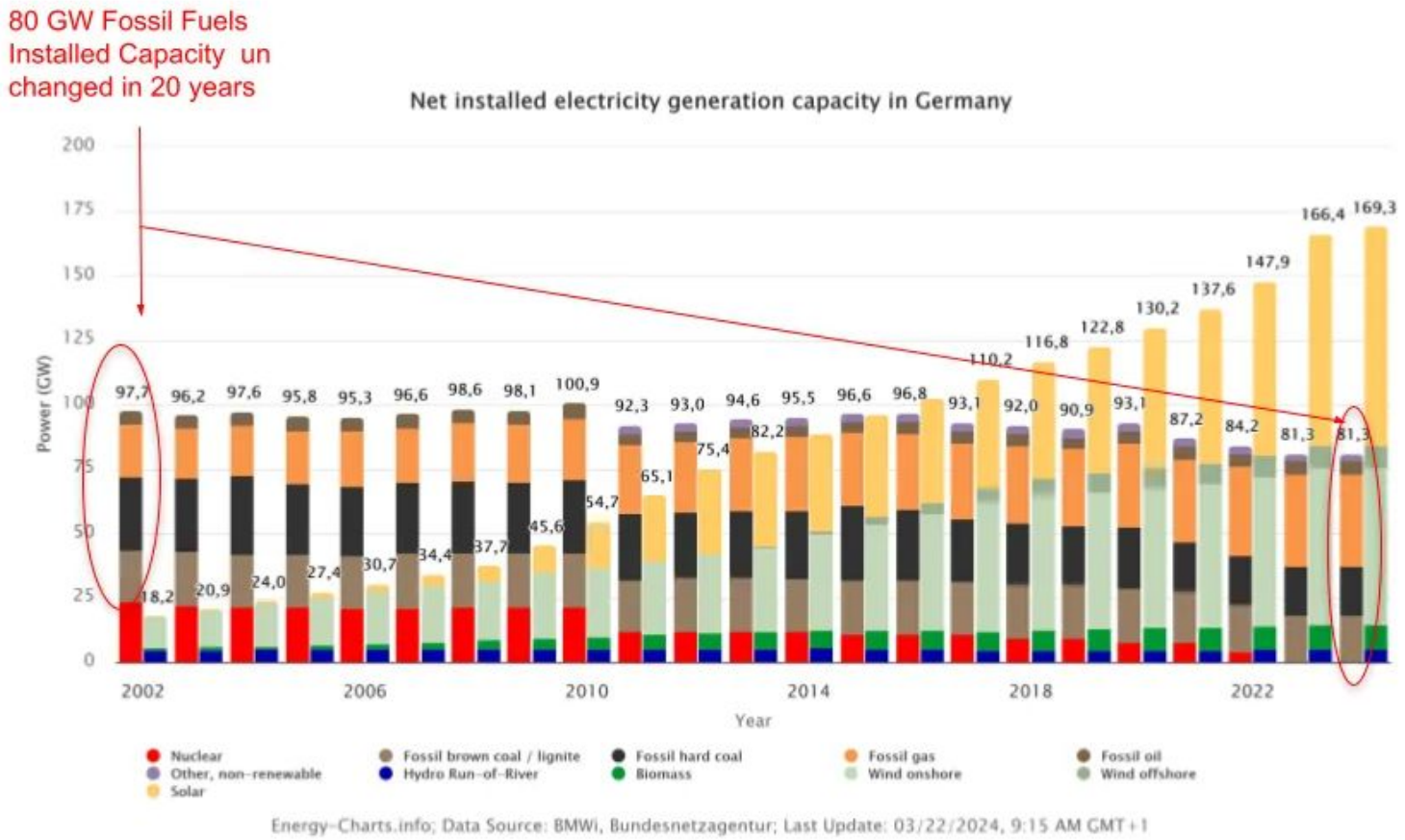
Duitsland kan dit waarskynlik nie meer doen nie, omdat hulle begin het om hulle reaktors uit diens te stel en van die verkoelingtorings op te blaas

Duitsland: Die behoefte aan krag betroubaarheid

Wat is die koste om stelsels ledig te laat staan?

HEINRICH BÖLL STIFTUNG · FRIEDRICH NAUMANN STIFTUNG Für die Freiheit. · ROSA LUXEMBURG STIFTUNG · Hanns Seidel Stiftung · FRIEDRICH EBERT STIFTUNG · Konrad Adenauer Stiftung

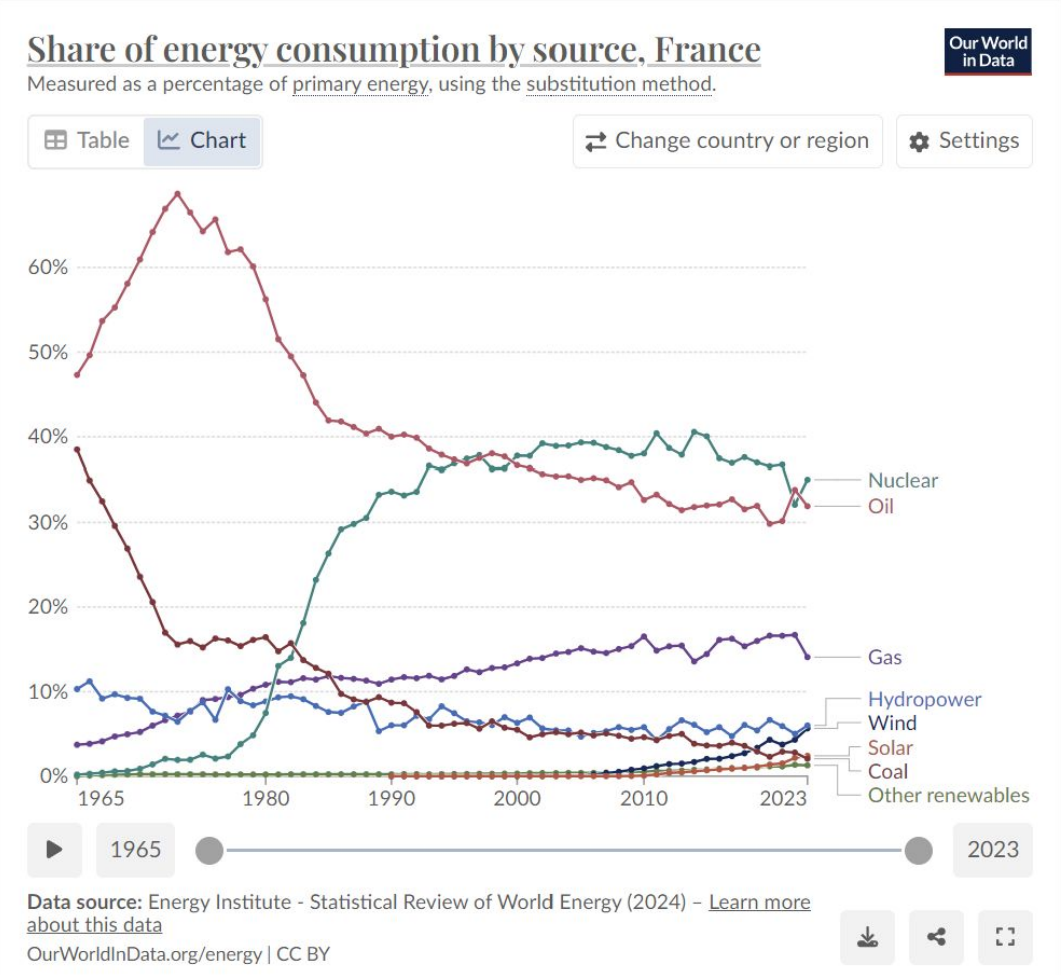
Source: Bundesministerium des Innern und für Heimat, Politische Stiftungen, [accessed on June 19, 2023] [online]



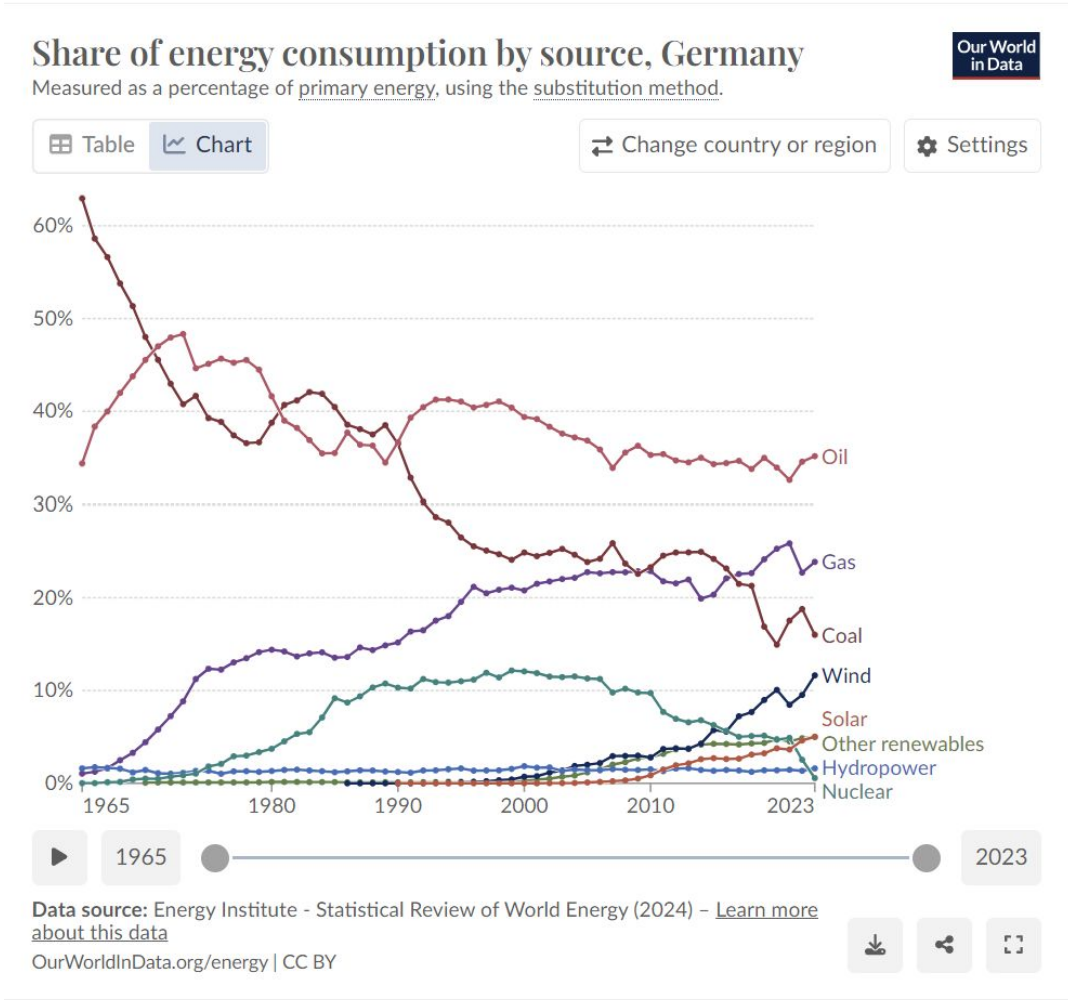
Duitsland sal teen vroeg in 2025 aanbiedinge soek vir waterstofgereed (LNG) kragsentrales.

https://www.reuters.com/business/energy/germany-seek-bids-125-gw-h2-ready-power-plants-2024-07-05/z

Frankryk, kernkrag oorheers kragopwekking

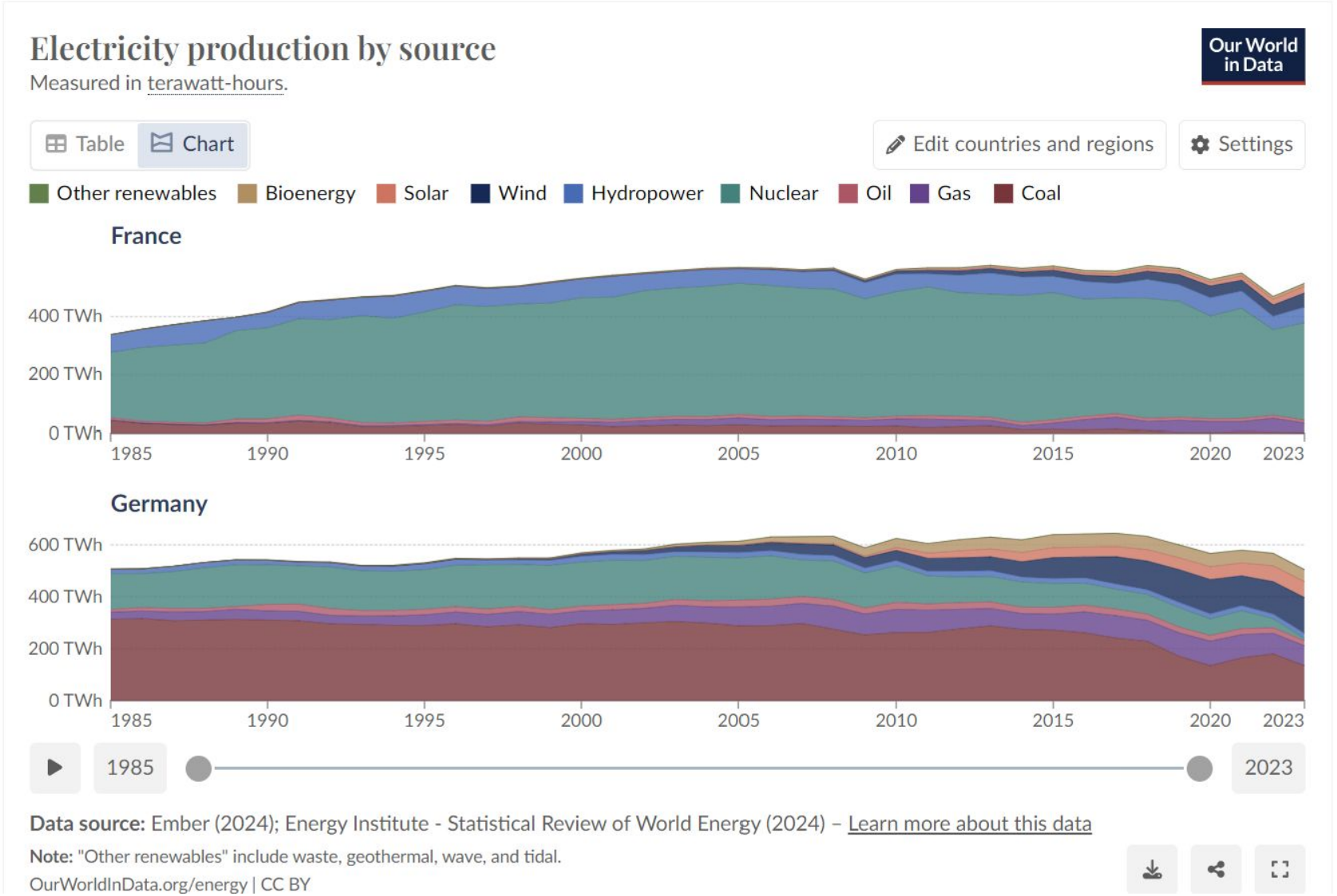


France: Nuclear and hydro has the highest share of Energy



Germany: Natural gas and Coal still have the highest share of ENERGY

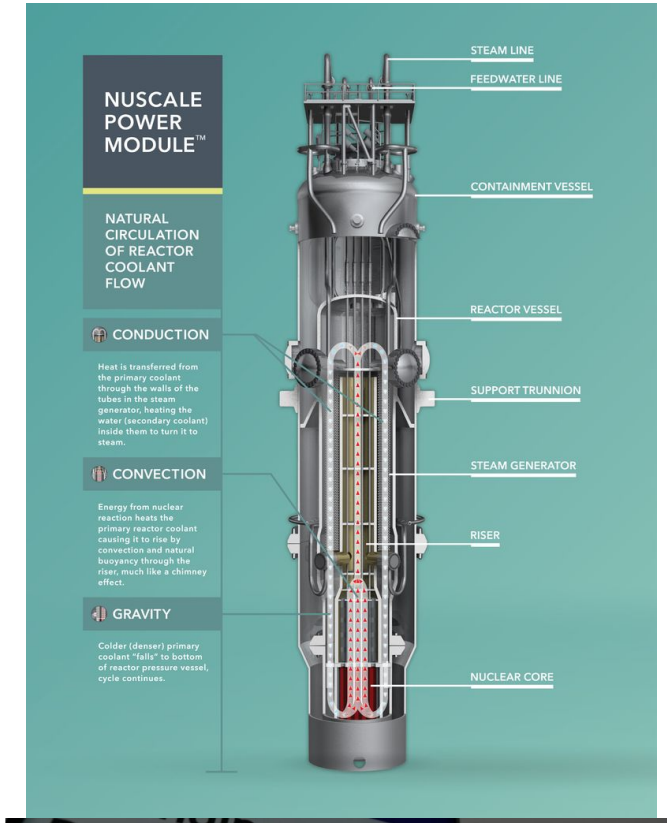
Frankryk, kernkrag oorheers kragopwekking

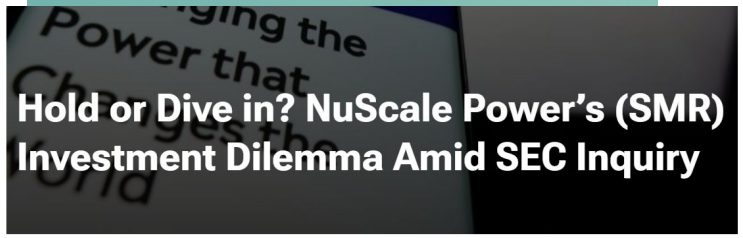


Generasie IV reaktors
Gevorderde reaktore

Klein modulêre reaktor (dit is 'n bietjie van 'n handelsmerk-term)

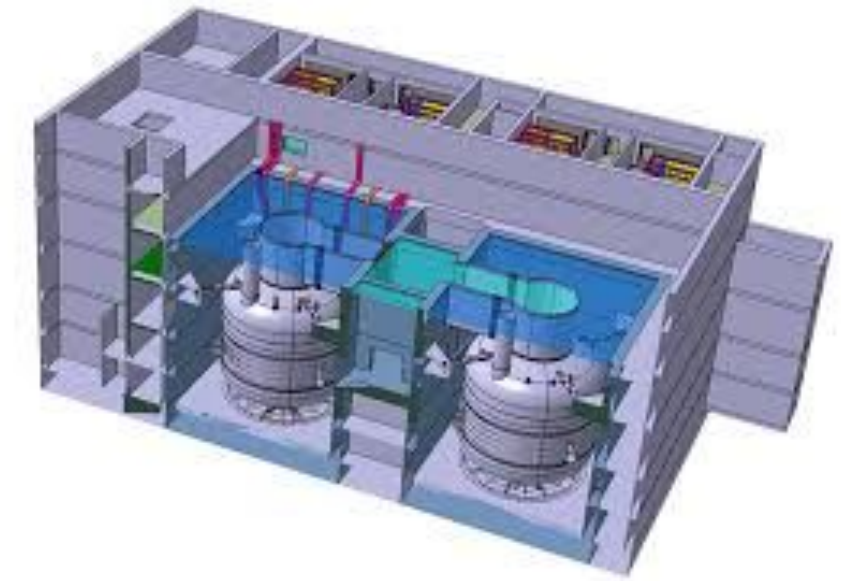
Tradisionele PWR
Nuscale (sukkel om 'n kliënt te vind, geen prototipe nie)





Casey Dylan, CIMA
Sep 05, 2024, 03:09 PM

Nuward Frankryk
(nog geen lewensvatbaarheid bewys nie)



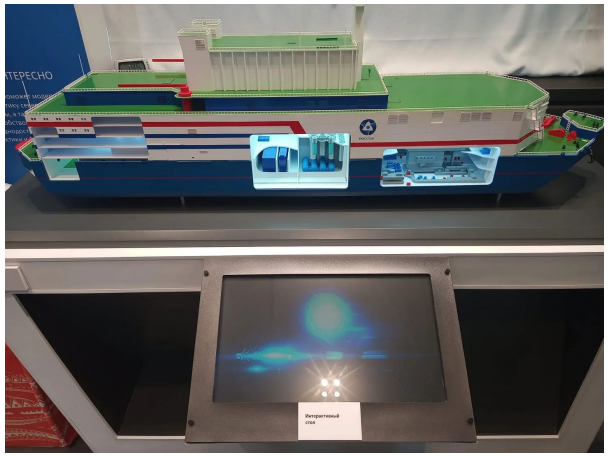
Energy | Grid & Infrastructure | Nuclear

France's EDF to redraft small modular reactor design amid cost, technology concerns

By **America Hernandez**

July 1, 2024 8:19 PM GMT+2 · Updated 2 months ago

Rusland se Akademic Lomonosov



Projek word tans in die netwerk ingevoer,
koste-oorskryding was 400% (amptelik verklaar),
die projek se lae EAF en koste impliseer dat die staat die elektrisiteit subsidieer

Hoë temperatuur gasverkoelde reaktor (Korrelbed)

Uit Openbare Verklarings is dit nie duidelik wat die koste/ekonomie is nie, vermoede is dat hulle in lyn is met die EersteSoort kos $10-15/Watt

A message from Goodway Technologies

Protecting Equipment Longevity and Performance

Learn More

ADVANCED REACTORS

Chinese pebble-bed reactor passes “meltdown” test

Wed, Jul 24, 2024, 10:01PM | Nuclear News

New testing done at China’s Shidaowan nuclear power plant has confirmed its ability to be naturally cooled down, an industry-first milestone for achieving commercial-scale inherent safety, according to researchers.

The Shidaowan plant, a demonstration high-temperature, gas-cooled reactor with a pebble-bed module (HTR-PM), went into commercial operation last December.

Hoekom moet Suid-Afrika nie met China saamwerk as hulle ’n werkende prototipe het nie? Trouens, baie ons ingenieurs het hulle geadviseer!

X Energy, VSA hoë temperatuur gasverkoelde reaktor (PBMR)

Hoekom moet Suid-Afrika nie met die VSA saamwerk nie?

energy

XE-100 XE-MOBILE TRISO-X Why? Tech Space

Is die verlies van vaardighede in ons nasionale belang?

https://www.biznews.com/interviews/2023/11/09/venture-capitalist-nuclear-energy-revolution-andre-pienaar

Advanced Nuclear Energy

Laura Garcia
Chief Accounting Officer
Laura's Bio

Thomas Nixon
Senior Vice President, Reactors
Thomas's Bio

Eben Mulder, PhD
Senior Vice President, Chief Scientist
Eben's Bio

Martin van Staden, PhD
Senior Vice President, Xe-100 Systems Development & ARDP Chief Engineer

Robert M. Taylor
Vice President, Regulatory Affairs and Licensing

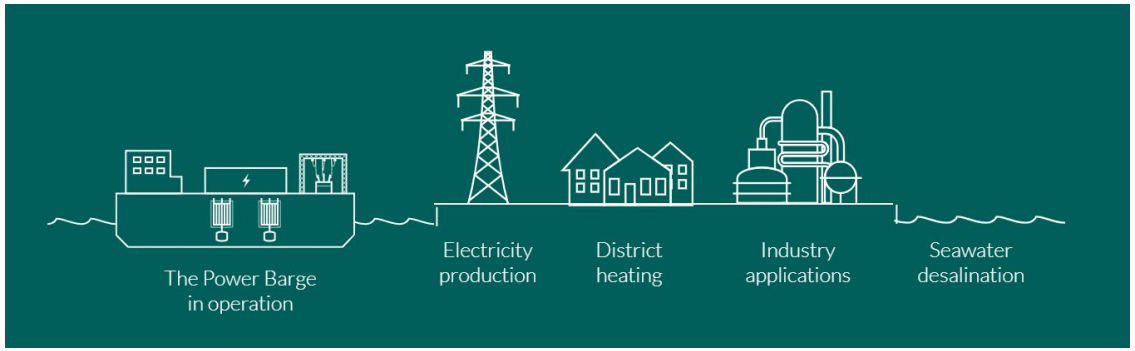
Michael Gigliotti
Vice President, Business Operations
Michael's Bio

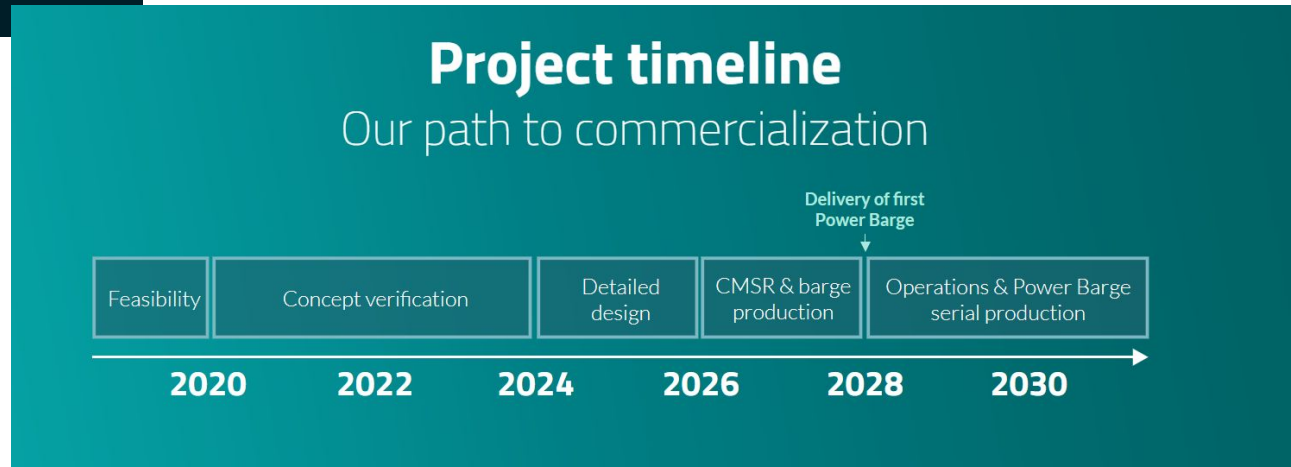
Gesmoltesout Reaktor (Moltex, Seaborg, Copenhagen Atomics)

PRESS RELEASE
04/07/2023

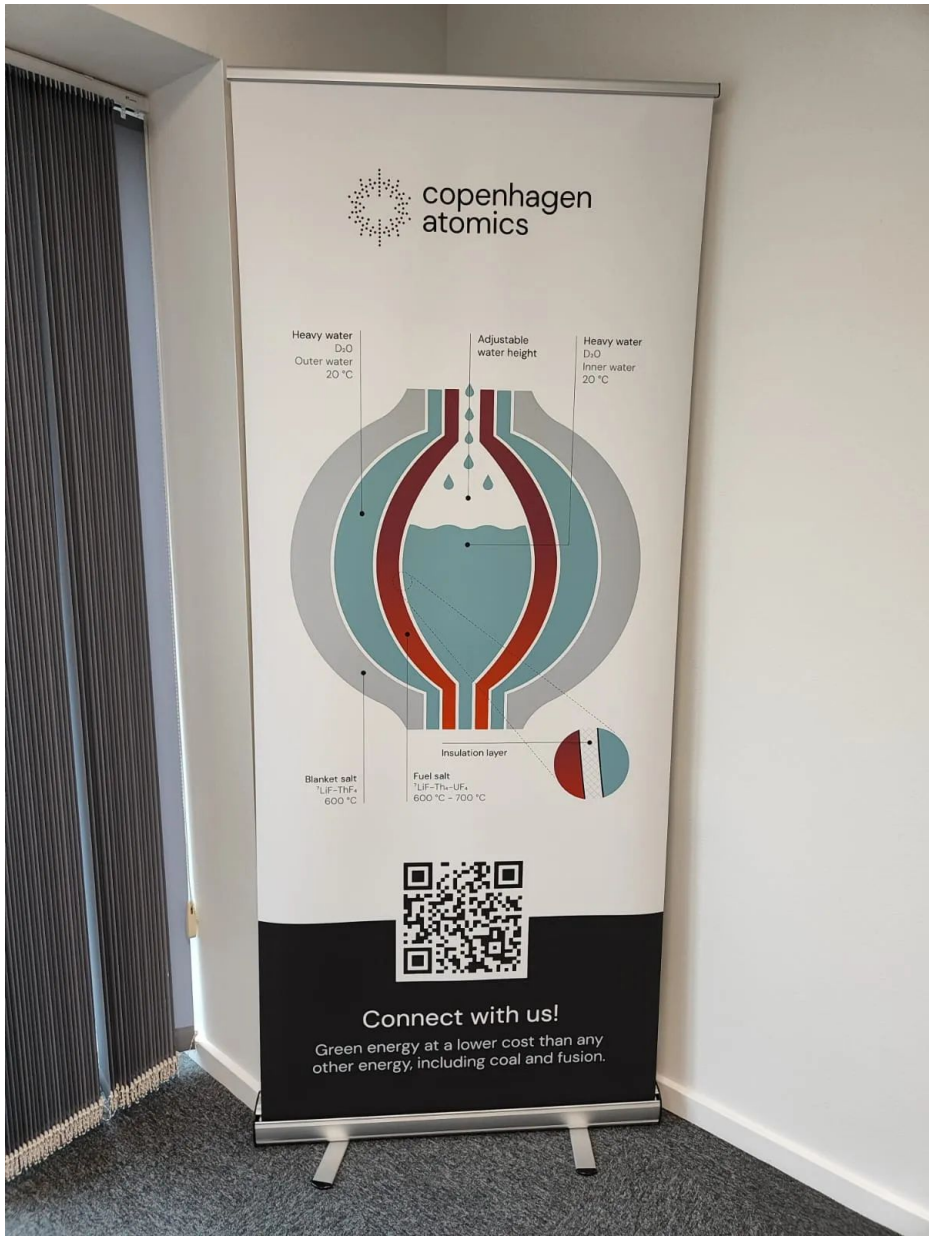
Seaborg confirms change of fuel type and signs Memoranda of Understanding for Fuel Salt development and production.

Seaborg took the decision earlier this year to change the fuel type for the first CMSR product line to LEU (Low-Enriched Uranium) due to the risks associated with developing a sufficient supply of High-Assay-Low-Enriched Uranium (HALEU) to meet Seaborg's envisioned timeline.





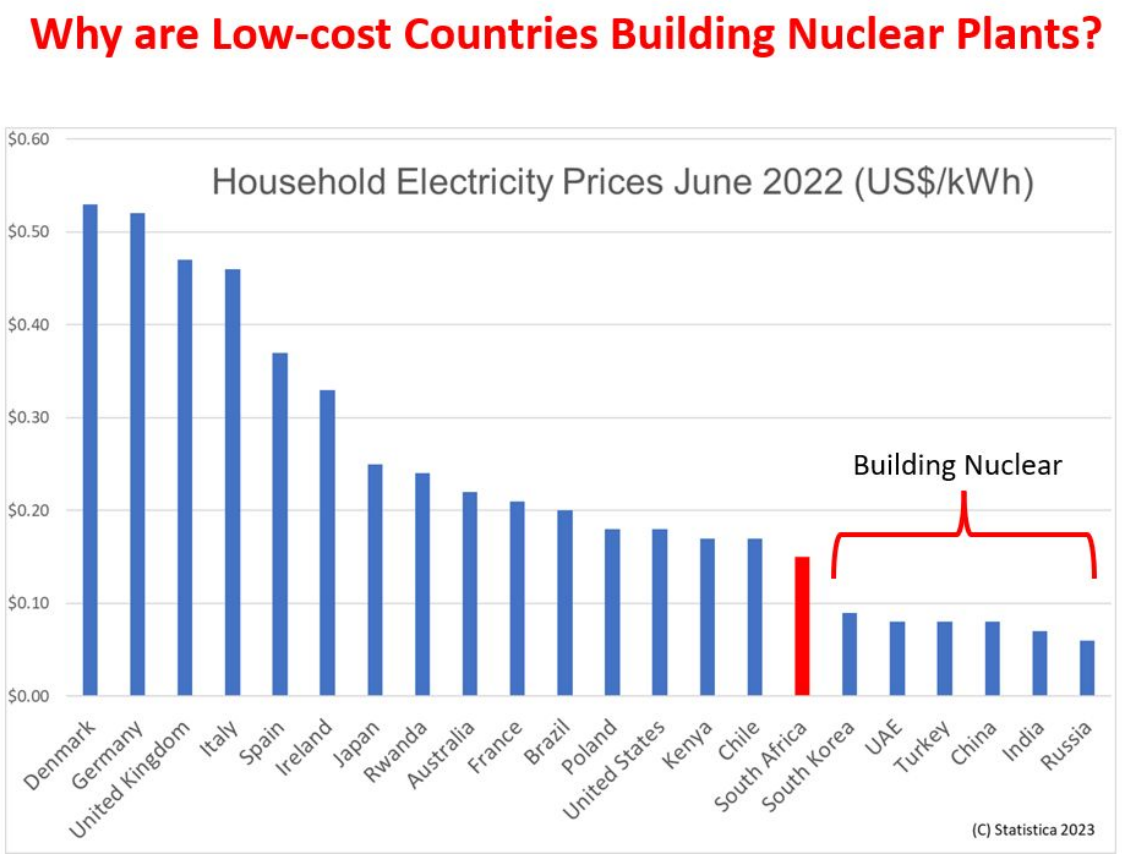
Denemarkte:
Gesmolte Sout Reactor

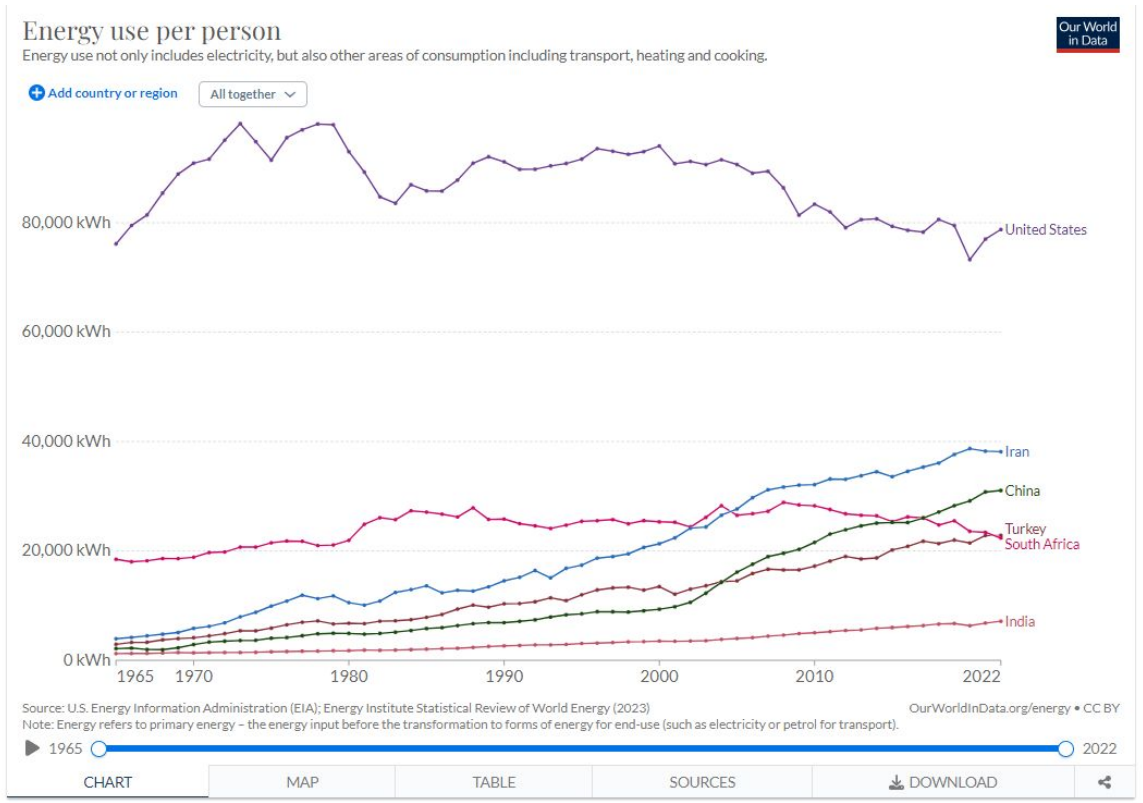


Gesmelte sout kan so laag as 1MWe gaan
Gesmelte sout kan lading volg met die tegnologie van gekonsentreerde sonkrag

Copenhagen Atomics, a Thorium Molten Salt Reactor Reactor-opstart op 'n onwaarskynlike plek

Kan kernkrag help om Suid-Afrika se elektrisiteitskrisis op te los?





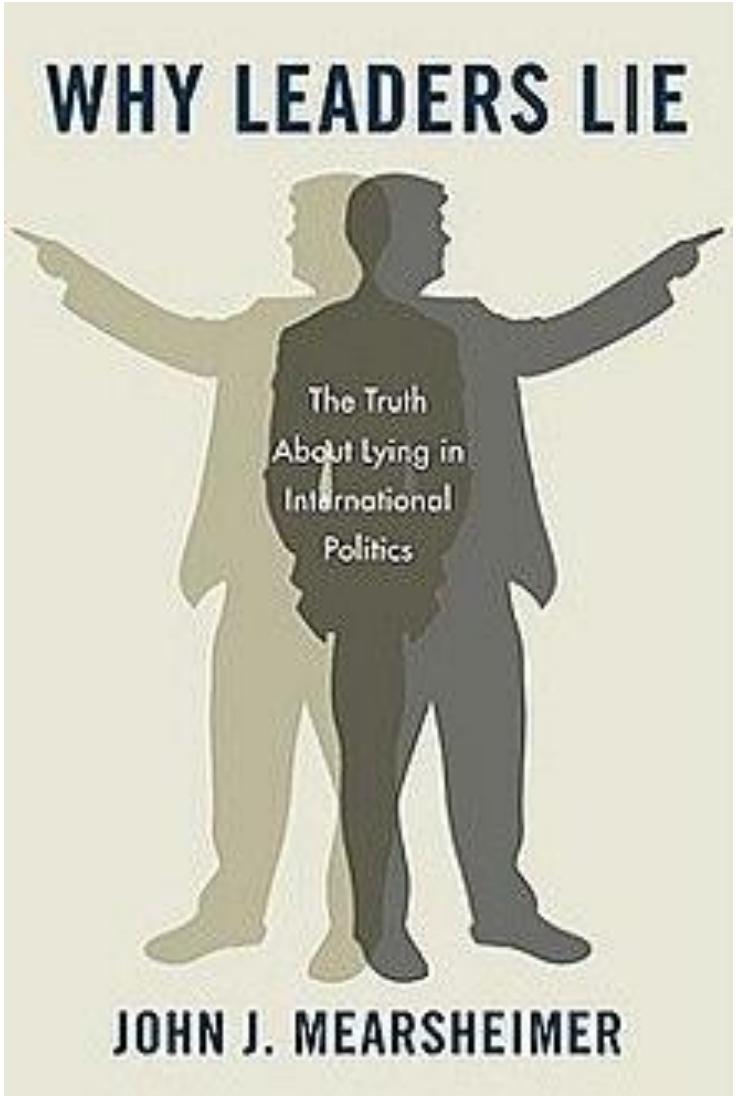
- Ontwikkelende lande met lae elektrisiteitsverbruik (tekorte)
- Lande met hoë vlakke van korrupsie (Indië, Egipte, Iran, Rusland, Turkye)
- Hulle benodig "verstuurbare elektrisiteit" wat beskikbaar is vir industrialisasie
- Staatsutiliteite, soos Eskom, verhaal gewoonlik koste met 'n redelike marge, maak nie wins nie.

Hoe moet kernkragtransaksies werk

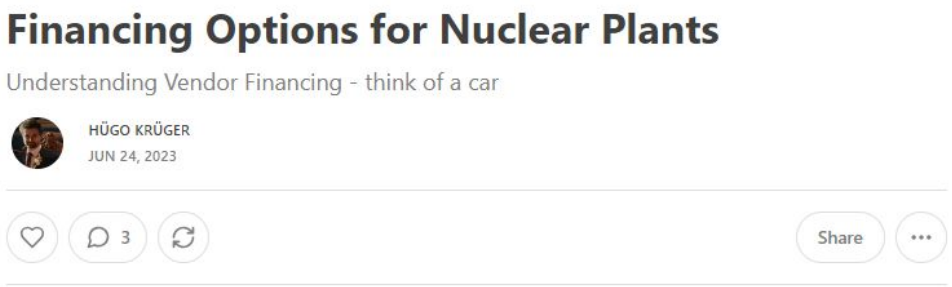
Selfs diktators soos Vladimir Poetin en Xi Xinjping is eerlik wanneer hulle met die toekoms van hul kinders dobbel.

Die risiko's moet tussen twee partye verdeel word.

'n Kernkragtransaksie is 'n langtermyn diplomatieke verbintenis 40-50 jaar.



Kan kernkrag help om Suid-Afrika se elektrisiteitskrisis op te los? Korrupsie, Verkoper Finansiering?



Bangladesh Nuclear Deal (2 x VVER1200)

The US$12.65 billion project will be constructed with Russian loan amounting US$11.38 billion and the rest will be financed by the Bangladesh government.

Pakistan Nuclear Deals (2 + 1 Hualong One)

He said under a difficult economic situation, Pakistan was getting an investment of USD 4.8 billion from China in this project, which "sends the message that Pakistan is a place where Chinese companies and investors continue to show their trust and faith". *(this is a loan for 100% of project cost)*

Pakistan Previous deal (2 x Hulong One unit)

In July 2013 ECNEC approved two units of the Karachi Costal power project with net generation capacity of 2117 MWe. The total cost of this was estimated at PKR 959 billion ($9.116 billion), with $6.5 billion (68%) being vendor finance. PAEC also said that 82% of the total cost would be financed by China.

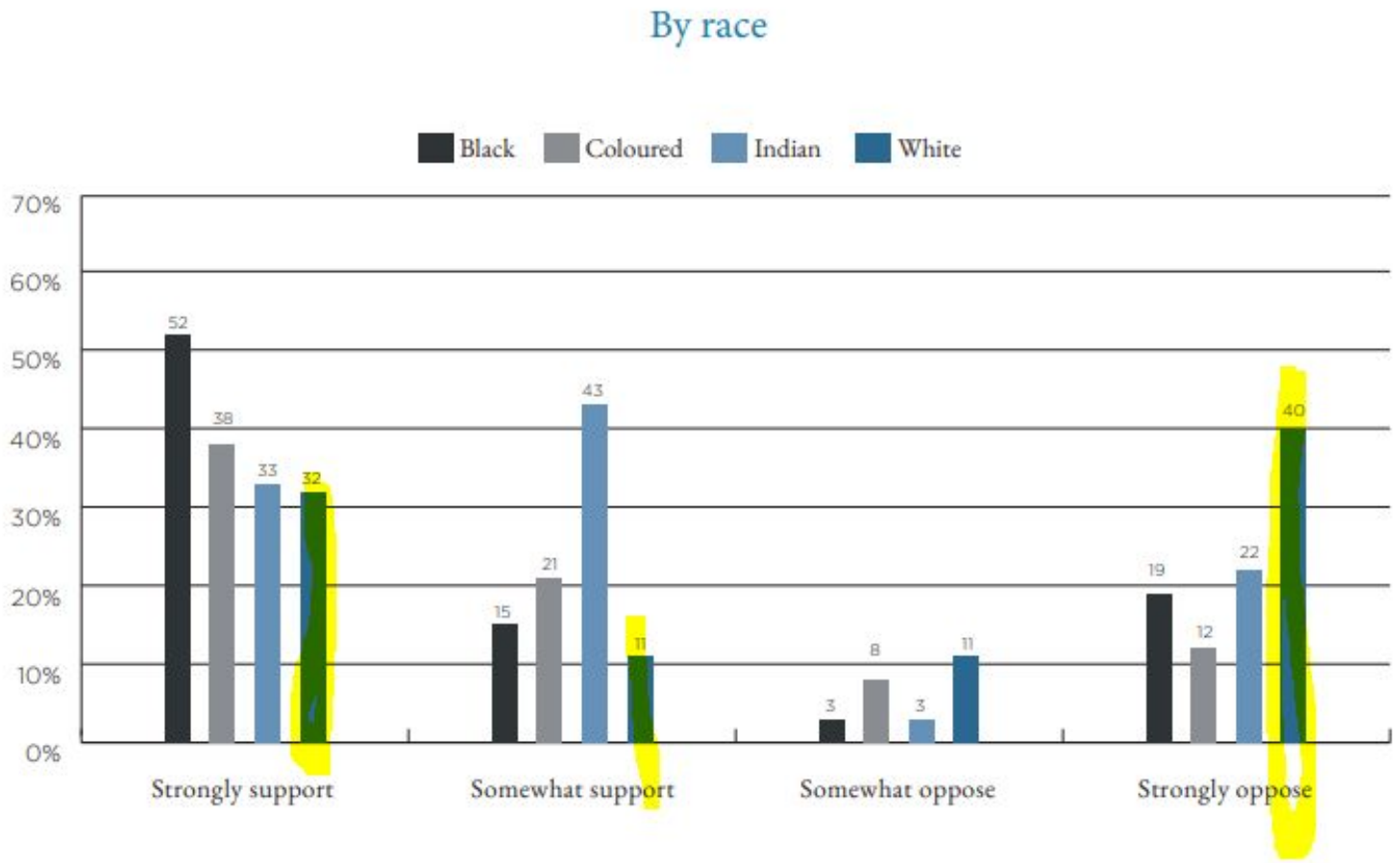
Hungarian Nuclear Deal (2 x VVER1200)

It extends an original contract between the two countries signed in 2016. The cost of the project is estimated at around $13.2bn (€12bn), $10.9bn (€10bn) of which will come from Russian loans, the *Global Construction Review* (GCR) reports.

Turkish Nuclear Deal (4 x VVER1200)

Financing is provided by Russian investors, with 93% from a Rosatom subsidiary. Up to 49% of shares may be sold later to other investors.

Politieke steun vir kernkrag in SA?



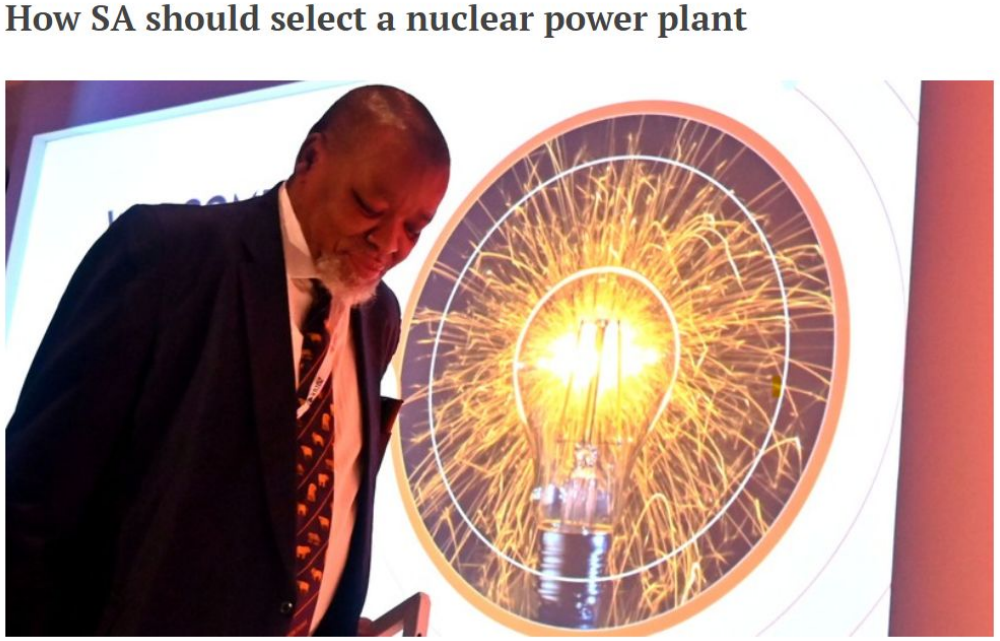
https://srfreports.co.za/wp-content/uploads/2023/06/SRF-Report-24-Electricity-policy-paper.pdf

Wat verklaar Suid-Afrika se wit skeuring 50:50?

Kan dit die Anglo Boereoorlog wees?

How should SA select a nuclear power plant?

- Cost
- Affordability
- Risk,
- Scares Skill Retention
- Desalination
- Developmental Needs (Eastern or Western Cape?)
- Intellectual Support (UCT and the DA are hostile to new Nuclear even though that's where they get their lights from)?
- Diplomacy, Non-Proliferation and the Treaty of Palendaba)
- Design Maturity:
- Recent Experience
- Track Record
- Strategy to counter the NGO Industrial Complex?
- Intellectual Property



https://www.iol.co.za/business-report/energy/how-sa-elect-a-nuclear-power-plant-c0add27e-ce72-44fc-a8ba-22f54e

Bo alles wat vereis word, is politieke toewyding

Kriteria vir die aankoop van 'n nuwe reaktor

Suid-Afrika behoort breedweg 5 vrae vir NPP-konstruksie te vra

-Koste/Bekostigbaarheid

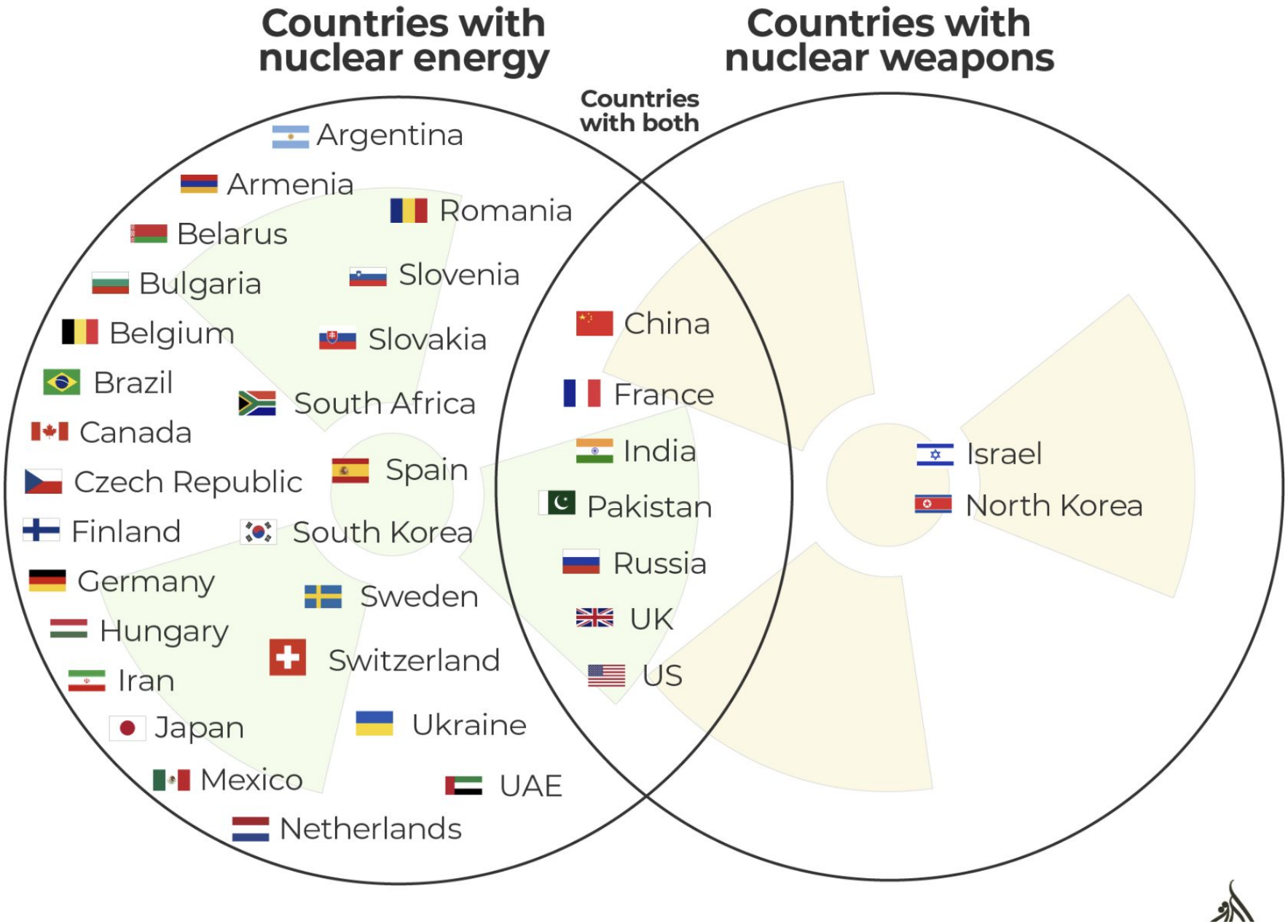
-Ontwerpvolwassenheid, is die uitvoeringsontwerp deur 'n reguleerder goedgekeur?

-Het jy ondervinding in die uitvoermark?

-Het jy 'n reeks reaktors in jou eie binnelandse mark

-Het jy 'n rekord van die voltooiing van die projek betyds?

- Internasionale Betrekkinge: 'n Kernreaktor is 'n 40 - 60 jaar diplomatieke verbintenis.


Countries with nuclear energy
Countries with nuclear weapons
Countries with both
Argentina
Armenia
Belarus
Bulgaria
Belgium
Brazil
Canada
Czech Republic
Finland
Germany
Hungary
Iran
Japan
Mexico
Netherlands
Romania
Slovenia
Slovakia
South Africa
Spain
South Korea
Sweden
Switzerland
Ukraine
UAE
China
France
India
Pakistan
Russia
UK
US
Israel
North Korea

IR-aspekte van Suid-Afrika: Die verdrag van Pelindaba

Suid-Soedan het nie onderteken nie (dit het toe nie bestaan nie)

Maar Egipte het nog nooit die verdrag bekragtig nie. Hoekom?

IR-aspekte van Suid-Afrika Kernkrag

Die Verdrag van Palendaba.

- Word aktief ondermyn deur Amerikaanse wapens wat in Diego Garcia gestasioneer is.

Diego Garcia: A thorn in the side of Africa's nuclear-weapon-free zone

By Peter H. Sand | October 8, 2009

Share

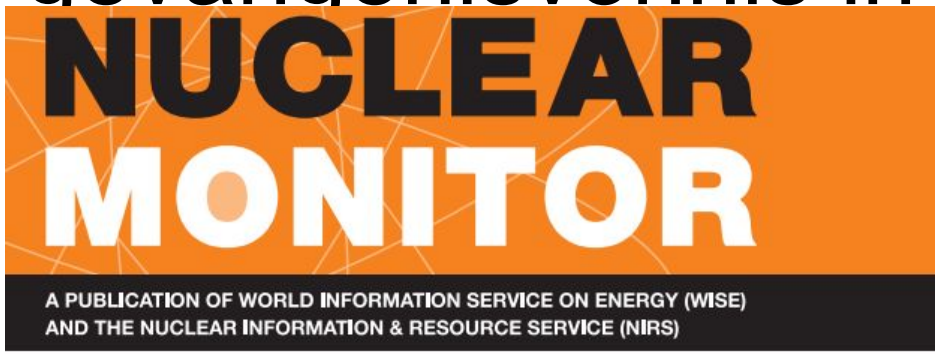
On July 15, the Pelindaba Treaty, which established Africa as a nuclear-weapon-free zone, finally entered into force. The treaty is the latest regional agreement to ban nuclear weapons in its area of application. The other five are the 1959 Antarctic Treaty, the 1967 Treaty of Tlatelolco (for Latin America and

Peter H. Sand

Sand is a lecturer international envi law at the Univers and a former lega the U.N. Environm Programme and...

"To the embarrassment of the FCO, the Diego Garcia base also has been confirmed by the CIA as a destination or transit point for several "extraordinary rendition flights" for suspected terrorists–branding the island as yet another "legal black hole" à la Guantánamo Bay, where neither the British Human Rights Act nor Britain's ratifications of the Geneva Conventions, the U.N. Human Rights Covenants, or the U.N. Convention against Torture apply"

R-aspekte: Waarom staar Netanyahu 'n gevangenisvonnis in die gesig?



MAFIA CLAN CONNECTED WITH TRAFFICKING NUCLEAR WASTE

Authorities in Italy are investigating a mafia clan for alleged illegal trafficking in nuclear waste and "clandestine production of plutonium". Eight former managers of the country's energy agency Enea were accused of connections with the Silician mafia Cosa Nostra and the Calabrian mafia 'Ndrangheta. The accusation came after a 12-year inquiry into Mafia involvement in nuclear waste disposal.

Israeli Prime Minister Netanyahu Linked to Nuclear Technology Smuggling Ring - FBI Files

NEWS PROVIDED BY
Institute for Research: Middle Eastern Policy →
28 Jul, 2012, 08:03 ET

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WASHINGTON, July 28, 2012 /PRNewswire-USNewswire/ -- The following is being released by the Institute for Research: Middle Eastern Policy -- The FBI partially declassified and released files linking Israeli Prime Minister Benjamin Netanyahu to a nuclear technology smuggling ring that targeted the United States. The declassified files are now publicly available online at http://www.IRmep.org/ila/krytons/06272012_milco_mdr.pdf

Dit is 'n gevolg van die nie ondertekening van die NPT. Die kernkragbedryf moet daartoe verbind.

IR-aspek: Die Russiese/Oekraïense Oorlog

-Soortgelyk aan Israel en Diego Garcia,

-'n Kernkragverkryging kan vrede voorwaardelik maak

-Om die verkoperlande, China, Suid-Korea, Rusland, Frankryk en die VSA aan te moedig om stappe te doen in die rigting van nie-verspreiding, kan druk op hul militêre nywerhede plaas.

Kan Groot Magte onderhandel word om te voldoen aan internasionale reg?

Is kernkrag-onbelyning 'n strategiese keuse?

IR-aspekte: Die geskiedenis van Iran se kernwapens

Iran is 'n drumpelstaat.

Iran het (nog) nie 'n WMD-program nie, dit het 'n fatwa teen kernwapens.

Iran gebruik egter die "bedreiging om 'n bom te kry" om te onderhandel.

Iran het voldoen aan die IAEA-inspeksies.

Israel het 90 kernwapens volgens die Federation of American Scientists

https://fas.org/initiative/status-world-nuclear-forces/

Israel het aktief ontken dat hulle wapens het (kerndubbelsinnigheid)

Waarom word Israel nie gedwing om te voldoen nie?

Kan Suid-Afrika bydra tot 'n kernwapenvrye Midde-Ooste?

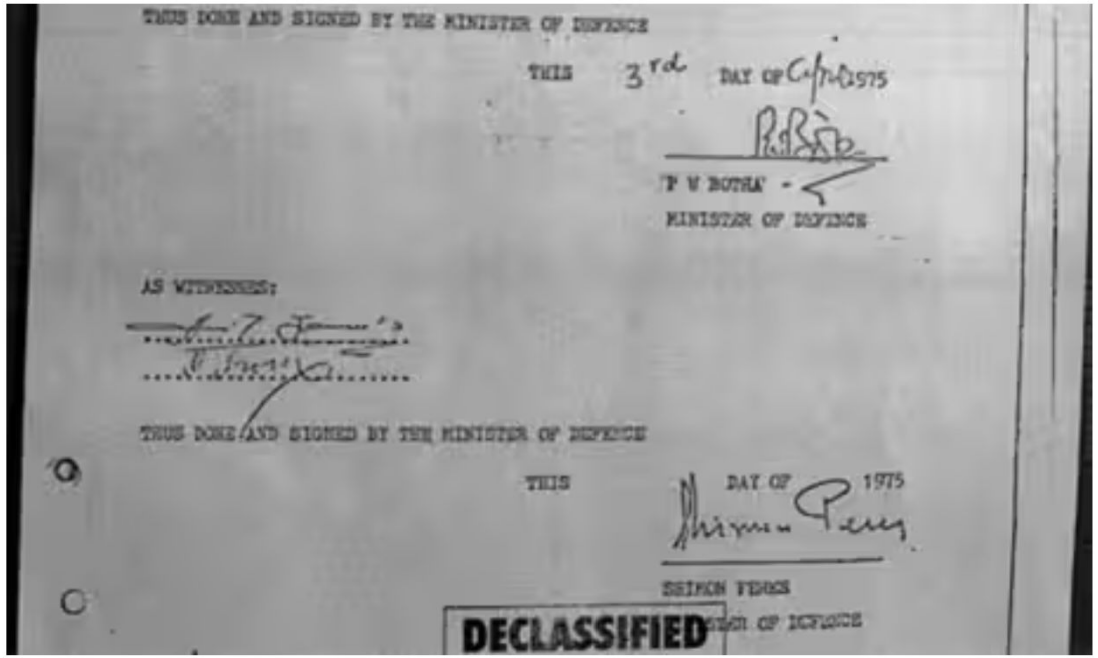
Suid-Soedan het nie bekragtig nie, maar Egipte ook nie? Hoekom?

Israel is die enigste Midde-Oosterse land wat tans vermoedelik oor kernwapens beskik (alhoewel dit nooit in die openbaar hul bestaan erken het nie), maar Iran het aansienlike pogings aangewend om dit in die afgelope dekade te bou.

Kan 'n nuwe burgerlike kernkragbou hierin help?

Revealed: how Israel offered to sell South Africa nuclear weapons

Exclusive: Secret apartheid-era papers give first official evidence of Israeli nuclear weapons



The secret military agreement signed by Shimon Peres, now president of Israel, and P W Botha of South Africa. Photograph: Guardian

Suid-Afrika kan sy kernkraghouding gebruik om druk op Israel te plaas. Dit is ook in Israel se belang!

Die "top geheime" notule van vergaderings tussen senior amptenare van die twee lande in 1975 toon dat Suid-Afrika se minister van verdediging, PW Botha, gevra het vir die plofkoppe en Shimon Peres, destyds Israel se minister van verdediging en nou sy president, het gereageer deur hulle aan te bied "in drie groottes".

Suid-Afrika kan sy kernkraghouding gebruik om druk op Israel te plaas

- Deur die Afrika-unie kan Egipte diplomaties onder druk geplaas word om die verdrag van Pelindaba te bekragtig, sodat Egipte op sy beurt daarvan weerhou kan word om met 'n kernwapengewapende buurman te doen.
- ’n Versoek om inligting (RFI) vir ’n kernkrag-nuwebou kan van stapel gestuur word met Suid-Afrika wat daarop aandring dat die verkoper ’n land is wat die nie-verspreidingsverdrag respekteer en nie kernwapens aan Israel verkoop nie.
- Suid-Afrika en die Afrika-unie kan die IAEA direk nader om te vra vir inspeksies van Israel se kernfasiliteite soos The Negev Nuclear Research Reactor wat die eerste keer onthul is deur die andersdenkende Israeliese wetenskaplike Mogochai Vanunu, wat steeds in huisarres in Israel is.
- Die laaste opsie is om die BRICS-forum te gebruik om Saoedi-Arabië en die ander Arabiese state aan te moedig om die stigting van 'n Palestynse staat en die ondertekening van die Midde-Oosterse kernvrye sone in te sluit as 'n voorvereiste vir die Abrahamitiese ooreenkomste.
- Daar word gevind dat Israel die nie-verspreidingsverdrag oortree het, en onder bestaande Amerikaanse federale wetgewing, soos die Symington Glen-wysigings, sal alle Amerikaanse hulp, diplomatieke en weermag ter sprake kom,

Civilian Nuclear Power kan help met die uitskakeling van kernwapens en dekarbonisering

South Africa Can Use its Nuclear Stance to Pressure Israel

https://consortiumnews.com/2023/11/21/south-africa-can-use-its-nuclear-stance-to-pressure-israel/

Kriteria vir die aankoop van 'n nuwe reaktor (2500 MW)

Suid-Afrika sal oor die algemeen 5 kriteria vir NPP-konstruksie hê:

-Koste/bekostigbaarheid?

-Ontwerpvolwassenheid, is die uitvoeringsontwerp deur 'n reguleerder goedgekeur?

-Het jy ondervinding in die uitvoermark?

-Het jy 'n reeks reaktors in jou eie binnelandse mark

-Het jy 'n rekord van die voltooiing van die projek betyds?

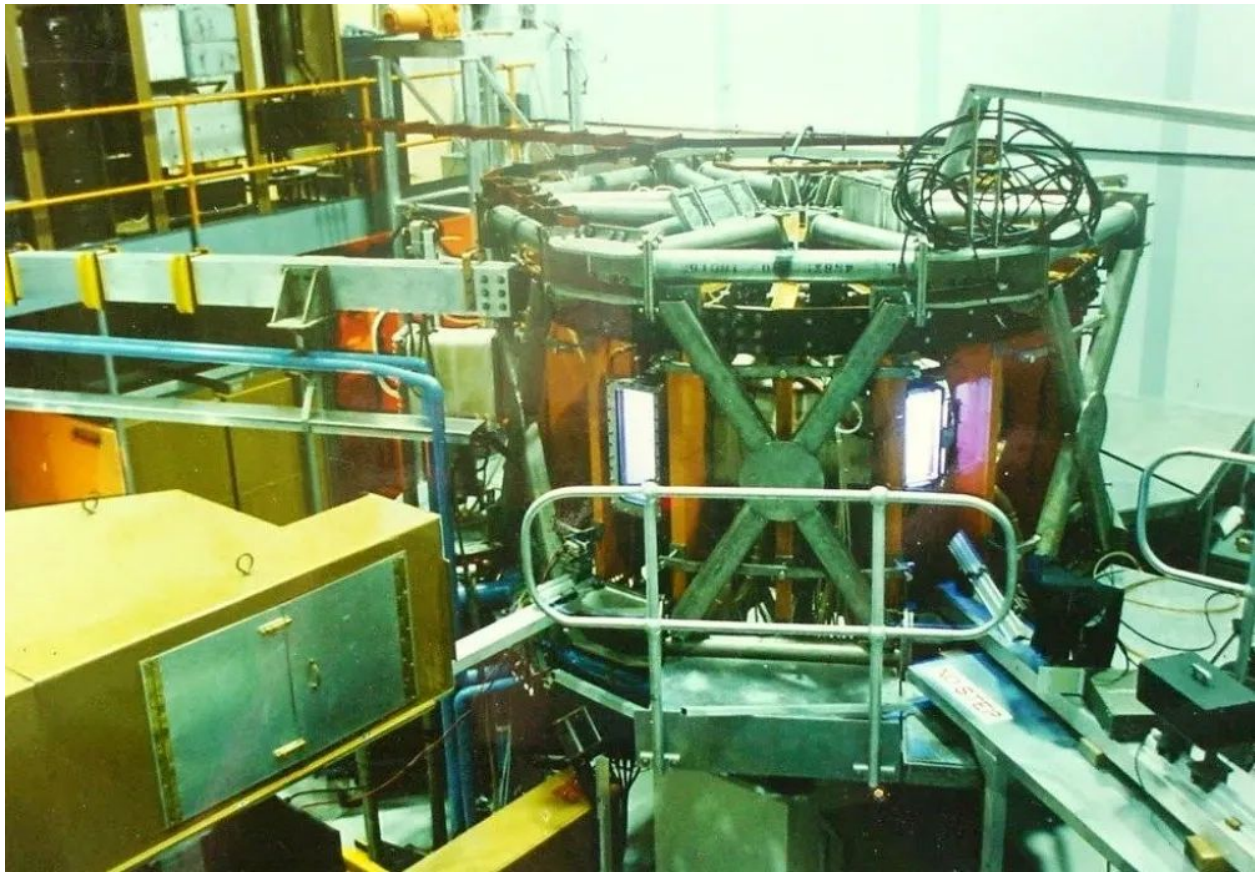
- Internasionale Betrekkinge: 'n Kernreaktor is 'n 40 - 60 jaar diplomatieke verbintenis.

Is kernonbelyning 'n strategiese keuse?

	Supplier Selection Criteria	France	Russia	China	South Korea	United States
1	Capex (proposed price) Not necessarily the real price	$7/Watt OK3 & FA3 $10/Watt Hinkley Point C FA3 and OK3 are state-funded, so the true WACC is hidden	$6.6/Wat t Egypt The Russian national bank finances at 3%, the true WACC is not reflected.	$3.0/Watt Pakistan The state obviously absorbs the risk.	$4.5/Watt (midpoint UAE) The contract included a corrupt military agreement, the price is questionable	$10/Watt VOGTLE Vogtle bankrupted Westinghouse, the main reason being political interference with the regulator
2	Vendor Financing	Export Credit Agency Restriction due to state Auditor Potentially can convince the IMF and the World Bank	National Bank The state absorbs cost overruns. Audited accounts are strict	National Bank The state absorbs cost overruns. Audited accounts are unclear	Shared Risk South Africa cannot absorb the debt Kepco is funded by the South Korean state	Export Credit Agency. Financing depends on who is in office. Suppliers have high levels of corruption
3	Intellectual Property	Yes	Yes	Yes	No Intellectual property depends on US policy and attitude towards South Africa Given the diplomatic dispute between South Africa and the US regarding the issue of Israel and Palestine, it is unlikely that the relationship will improve	Yes, but complicated US export controls are incredibly strict and often lead America to universalize its intellectual property laws
4	Domestic Market	Yes	Yes	Yes	Yes	Yes
5	Export Market Experience	Yes	Yes	No, only 1 reactor under construction in Pakistan	Yes, but only one plant in the UAE	Yes
6	Track Record/Recent Experience	Underperforming although several sites are under construction series of reactors with EPR2 and EPR1200 in production France has acknowledged its mistakes in HPC and FA and is therefore applying corrective measures. A series of reactors is under construction	Decent Although the proposed price does not reflect the true cost	Excellent, a series of reactors is under construction	Excellent Although the proposed price probably does not reflect the true cost Corruption involved in the agreement with the UAE	Very poor
7	Geopolitics	Non-signatory of the NPT, although having made disarmament commitments (ambiguous). Strong 40-year relationship, several French companies are present in South Africa The regulator is independent and regularly works with South Africa	Conflict in Ukraine The Democratic Alliance will never accept Russia as a partner. South Africa's foreign trade is still over 40% Western. The Russian regulator is not separate from Rosatom	Non-signatory of the NPT, Potential implications for AGOA, although not certain BRICS country The PBMR SMR program in China started once South Africa recognized Taiwan	NPT signatory, but No intellectual property Will have to give sovereign debt guarantees	Undermining the Treaty of Pelindaba The uranium smuggling mafia implicating Netanyahu, Israel, and Diego Garcia is too sensitive for South Africans Diego Garcia was on the EFF's election manifesto The EFF is the extremist Africanist party
8	Design Maturity	Yes	Yes	Yes	Yes	Yes

Suid-Afrika se Fusion Reactor

Ontmoet Tokoloshe!



https://hkrugertjie.substack.com/p/south-africas-tokamak-fusion-reactor

"So I managed to get a stay of execution of the Tokomak for 2 years with the requirement that at least two International papers would be accepted for publication which I knew was in the bag. In 1994 the facility was shut members then distributed around the world to USA, Greece, ... while some went into the academic world of Universities local and overseas. Big loss of know-how which existed here and across the whole of the site"

-Dr Don Mingay

Baie Dankie
Enige Vrae?